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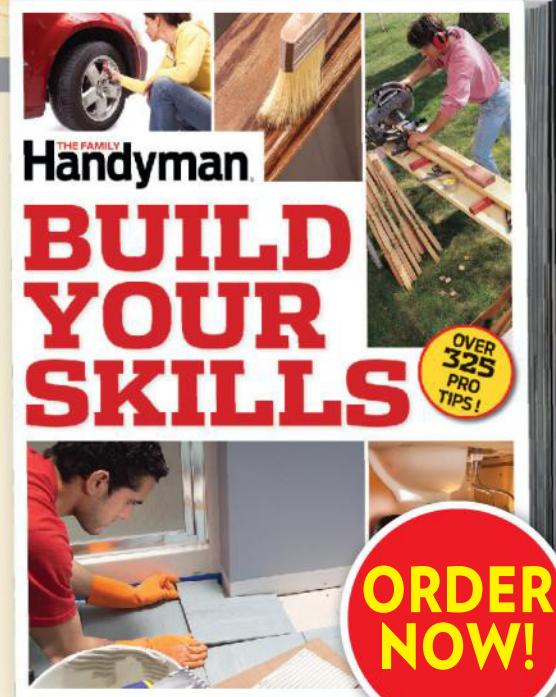
- **325+ Pro Tips & Techniques** teach you how to ace the basic building blocks of home improvement.
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There's scratch and dent—and then there's the stuff that just gets crushed.

DIY Universe**The best gift you can give**

Every month, I get reader emails that start something like

this: "My DIY education began years ago when I got a gift subscription to *The Family Handyman*..."

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Ho, ho, ho!

Gary Wentz, Editor-In-Chief



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Stuff We Love

Our favorite DIY tools, materials + gear. By Spike Carlsen



TAX REFUND SPLURGE

Low-hassle nailing

My compressor frowned at me when I brought home a DeWalt cordless brad nailer a year ago. Now that I've brought home its big brother—the DCN650D1 15-gauge cordless angled finish nailer—my compressor won't even speak to me. This duo has nearly put the noisy old relic out of business.

What do I love about this nailer?

- For starters, the "micro nose" allows you to see your mark more easily and drive nails—from 1-1/4 to

2-1/2 in. long—precisely where you want them.

- Its dual-purpose headlights light up your work area and flash if your battery is low (left headlight) or if you have a nail jam (right headlight).
- Speaking of jams, this nailer has the easiest-operating jam-clearing latch I've ever encountered. It loads easily too.
- It comes with a 90-day money-back guarantee, one-year free service and a three-year limited warranty—a pretty strong vote of confidence from DeWalt.
- When I was getting to know this

nailer, I discovered a surprise feature—a pencil sharpener built into the tail end of the nail chamber. That's a bit like the bud vase they give you with a new VW bug.

This tool has other cool features, such as a depth-adjustment wheel, a belt hook and a selector switch so you can bump-nail.

Sure, this nailer has a few drawbacks—like the \$400 price tag for the complete kit. And it's a little heavier and bulkier than my pneumatic nailer. But you can't beat the hassle-free nailing. Get more information at dewalt.com.

STUFF WE LOVE



SUPERPOWERS!

Turn your phone into a thermal camera

The new FLIR ONE Pro infrared camera is perfect for contractors, home inspectors and serious DIYers to help locate air and water leaks around windows, doors, ducts, ceiling openings and rim joists. The infrared camera can also "see" through walls to locate missing insulation and detect some plumbing and electrical issues. The FLIR ONE Pro connects to Apple and Android phones and smartwatches using either a Lightning or Micro USB connector. The connector is designed to extend up to 4 mm so you don't have to remove your phone case to connect the camera. Plus, the unit has an internal battery, so it won't drain your phone battery like other add-on infrared devices.

The FLIR ONE Pro has an optical and thermal camera that automatically "embosses" the thermal image on your screen with the optical image. So you get sharp edge detail right on the thermal image, giving you almost a 3D view of the situation. The FLIR ONE Pro has three spot meters so you can capture up to three temp regions in a single image. The meter measures temps from minus 4 degrees F to 752 degrees F.

The FLIR ONE Pro sells for \$400. Or, choose the less expensive FLIR ONE (\$200) if you don't need three temperature readings. The FLIR ONE has a single spot meter and a range of minus 4 degrees F to 248 degrees F. For more information, go to flir.com/flirone/pro.

GOTTA HAVE IT

A folding knife with fast blade access

The Quickdraw XLR knife proves the adage that good things come in small packages. What's so darn good about it? The feature I like the most is the triangular button near the tip that allows you to release and install blades, tool free.

Speaking of blades, the XLR system has special blades for special tasks, insulation blades that cut more efficiently, standard blades with snap-off tips to maintain a sharp edge, and "tanto blades" with spearlike tips for making drywall cutouts.

I like that it can be used in the extended (shown) or folded position. It feels great in the hand, slides easily into the pocket and even has a clip if you want to secure it to your belt. Available at online retailers or directly from paziusa.com for about \$30.



ABOUT TIME

A STRONGER, LONGER-LASTING SANDING DISC

Open-mesh drywall sanding sheets have been available for years. They work fast and don't clog. So, it was just a matter of time until someone designed random orbital sander discs based on this principle.

Diablo SandNet discs come in five grits ranging from coarse (No. 80) for leveling and shaping wood to super fine (No. 400) for sanding. The discs can be cleaned by shaking, spraying or vacuuming. Just slap the special connecting pad onto your sander's standard base, then secure a hook-and-loop SandNet disc to the pad. They work on both five- and eight-hole sanders. The company claims the discs last 10 times as long as standard discs.

A pack of 10 discs, along with an application pad, costs about \$15 at homedepot.com.

Blade Release



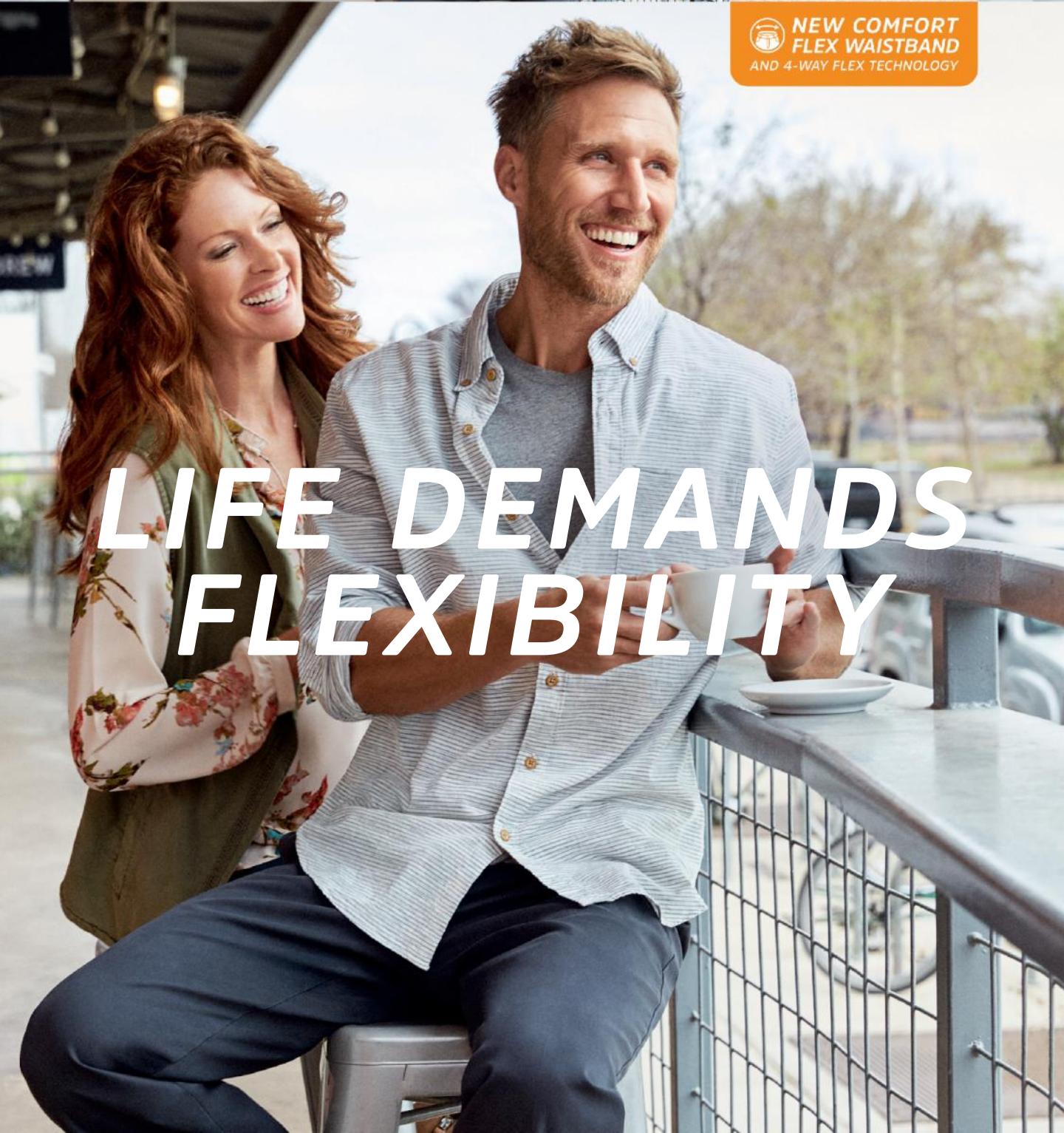


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STUFF WE LOVE



BACK SAVER

Handle panels with ease from truck to table saw

Someday I'm gonna have a big cabinet table saw with infeed and outfeed tables the size of helicopter landing pads. But until that day comes, I'll be keeping this two-wheeled wonder hard at work.

The PortaMate plywood tote functions in two modes: When it's collapsed, it can be used to wheel plywood into and around your shop. It's a real back and finger saver. But what I really love is that with the push of a handle, you can swing the plywood into horizontal mode, ready to push through your table saw (you need to adjust it to the saw's table height the first time you use it). And it folds flat for storage.

The PortaMate PM-1800 Panel Carrier is available at home centers, Rockler stores and rockler.com for about \$110.



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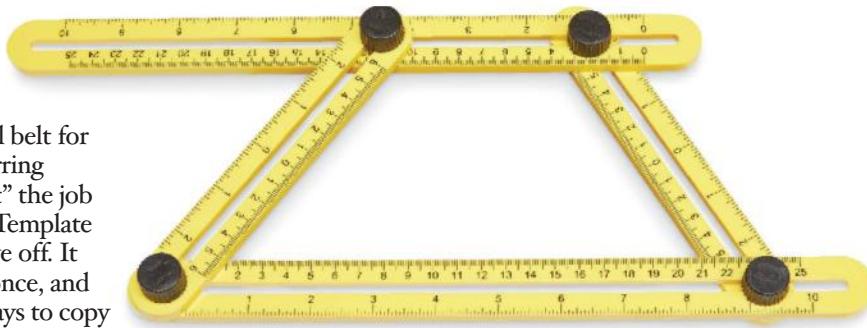
Forbo
FLOORING SYSTEMS

WORK FASTER

A NEW ANGLE ON ANGLES

I've carried a Speed Square in my tool belt for decades for figuring out and transferring angles. But it can't always "figure out" the job at hand. The EZ-Angler Measuring & Template Tool picks up where other squares leave off. It can be adjusted to copy two angles at once, and can be configured in many different ways to copy and transfer weird shapes. It also has metric and standard measuring guides for determining lengths and centers of materials. I found it super handy for installing plank flooring and laying pavers.

The EZ-Angler and similar template tools cost about \$20 online and at some home centers.

**PROBLEM SOLVER**

Security anchor

What do you do when you don't have a place to lock your bike, canoe or construction materials while you're away? Sometimes—unfortunately—call the police to report a theft. The Kryptonite Stronghold Anchor, once installed, provides a safe, permanent anchoring spot for your stuff.

This clever, tamper-resistant system involves drilling three holes and installing bolts to anchor the heavy-duty security hook to cement (bits included). A dome covers the hook and bolts. The anchor can also be installed in truck beds or secured to other surfaces using your fasteners. The instructions are clear, the design is clean and simple, and it comes with a lifetime warranty (well, you know, sorta). The complete unit costs about \$70. Get more information at kryptonitelock.com.

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ROLLER SPINNER

To spin-dry a mini roller, chuck a 1/4-in. bit into your drill. Slip the roller onto the bit and pull the trigger. Centrifugal force whips the water right out. I recommend doing this in a bucket, utility sink or outdoors.

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Mr. MOGOM | Amazon Review



DD500X

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GET SHARP AND GET BACK TO WORK

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 **Drill Doctor**



MAGNETIC TOOLBOX LABELS

Tired of trying to figure out which toolbox drawer had the tool I was looking for, I bought magnetic business cards at an office supply store (\$25 for a pack of 100). I peeled the film off the front, stuck a piece of card stock on top of it (old business cards work great) and labeled each drawer.

LAURA VOGEL



MAKE YOUR OWN AWL

I like to use an awl to punch small holes in drywall for plastic screw anchors. An awl pushes through easily, resulting in much less dust than drilling. Store-bought awls are usually too small for this task, so I make my own by grinding a sharp tip onto the end of an old, worn-out screwdriver using a disc sander or bench grinder.

JOSH RISBERG





MAGNETIC APRON TIE



My shop apron strings were constantly coming untied, so I started using a magnet to hold them together. I took two short pieces of 5/8-in. dowel, drilled a small hole in each, and threaded my apron strings through them. Then I took a rare earth magnet mounted in a steel cup and glued it to the end of one dowel and glued a steel washer to the other one. Now I just click my apron strings together when it's time to work! Rare earth magnets are available at woodworking stores for about \$15 per pack.

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DIY Essentials

Our best tips for getting your project done right. By Brad Holden

Prevent Frozen Pipes

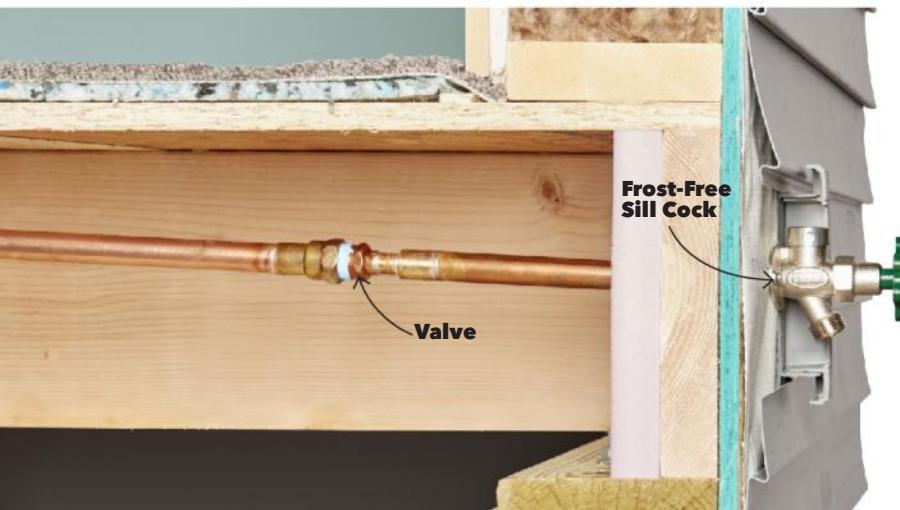
13 tips to prepare your plumbing for winter

We all know that water expands when it freezes. That's not a problem with the ice cubes in your freezer, but if that ice forms in your plumbing, it's a potential disaster. A frozen pipe can crack, spewing hundreds of gallons of water into your home. Fortunately, you can take steps to help prevent a catastrophe and put your mind at ease.



1 Shut off outdoor faucets

Turn off outdoor faucets at their shutoff valves. Open the faucet and then open the bleeder cap on the shutoff valve to drain any water out of the pipe. If you don't drain the pipe, it can still freeze and crack. Leave the bleeder cap open with a bucket underneath to catch any drips. If the dripping continues, your shutoff valve needs to be replaced.



2 Install frost-free sill cocks

Unlike a typical faucet, the working parts of a frost-free sill cock—valve, seat and washer—are located up to 18 in. inside the wall instead of right at the faucet. When the sill cock is properly installed, with a slight downward pitch, water drains from the pipe every time you turn off the knob at the faucet. Frost-free sill cocks are available at home centers for \$15 to \$55.



3 Disconnect hoses

A water-filled hose left out in cold weather will freeze. If the hose is still connected to the faucet, ice can back up into the pipe inside your house, causing the pipe to crack. Disconnect all hoses from their faucets, drain them and store them for the winter.

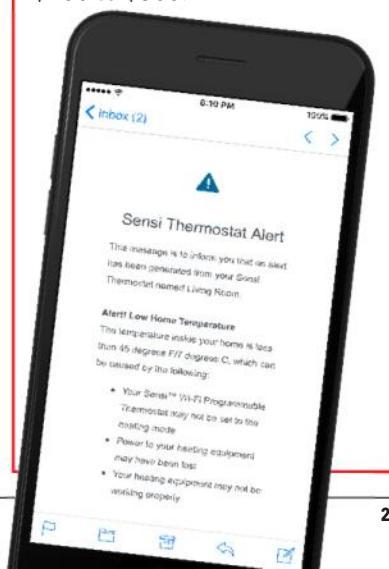


4 Cover hose bibs

Insulated covers slow the heat loss from a pipe as it travels through the wall out into the cold. They provide some protection for very little cost (about \$3 at home centers).

5 Get an early warning

A Wi-Fi thermostat lets you control and monitor your home's temperature using your smartphone. If the temperature in your house drops, you'll get an email or text alert. Other types of alert systems are also available. Some send alerts to your cell phone via a phone jack in your house. Others send an alert to a landline or cell phone. For more on these devices, see our Winter '17 issue or visit familyhandyman.com. Wi-Fi thermostats are available at home centers for \$100 to \$500.



DIY ESSENTIALS



6 Install heat cable

Heat cables are a perfect solution for vulnerable pipes. They have an integral thermostat that senses pipe temperature, turning the heat on and off as needed to keep the pipe from freezing. You'll need an accessible outlet to plug in the cable. Heat cables are available at home centers for \$15 to \$40, depending on the length.



7 Seal around rim joists

The rim joist is a likely area for cold air intrusion. Seal cracks or holes using expandable foam and then insulate between the floor joists. Be sure that you don't insulate a pipe from the heat in the rest of the house. Also, inspect around holes where cables, wires or pipes pass through an exterior wall. Insulate where you can, and seal drafts with caulk or expandable foam. After insulating, be sure you have combustion air for the furnace coming in through a makeup air pipe.



8 If you leave town, shut off the water

If you're leaving town for a few days or more, turn the water off at the main shutoff. That way, if a pipe does freeze and crack, you'll have far less damage. Shut off your automatic icemaker so it doesn't continually try to make ice, burning out the motor. Even if the ice bin is full, the ice will evaporate and the icemaker will try to make more.



9 Insulate pipes

If you have pipes in an unheated area, such as a crawl space, an attic or a garage, use heat cable and cover it with pipe insulation. Pipe insulation alone does little, as it's only a matter of time before cold air can reach the pipe. In fact, insulating pipes without also using heat cable can prevent warm air from getting to them. Various types of pipe insulation are available from home centers for about \$2 to \$6.

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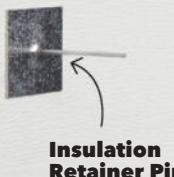
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10 Insulate your garage door

If you have water lines in the garage, insulate the garage door, if not the whole garage. Consider a combination of heat cable and insulation as well. If it's really cold, put a portable heater in the garage.



DURING A COLD SNAP:

What constitutes a cold snap depends on your climate and your home's insulation. A temperature of 32 degrees F isn't cause for alarm in Minnesota, but it might be in Mississippi.



1 Keep the temperature steady

During extreme cold, bypass your thermostat's program and leave the temperature steady. You may even want to turn it up a couple of degrees.



2 Open kitchen cabinet doors

Being behind closed doors, kitchen plumbing pipes are vulnerable, as the heat from the rest of the house can't reach them. Open the cabinet doors to allow heat to circulate into the cabinets. A fan or portable heater pointed inside the cabinet also helps circulate warm air.



3 Leave faucets running

A trickling faucet acts as a relief valve for the pressure that builds up if a pipe does freeze. That pressure relief can prevent a frozen pipe from cracking. A slow trickle is all you need. It'll bump up your next water bill a bit, but compared with major home repairs, that's an easy price to pay. Don't leave a faucet running if the drain is on an exterior wall, though; the drain can freeze, causing the sink to overflow.

Refresh your holiday memories aboard the

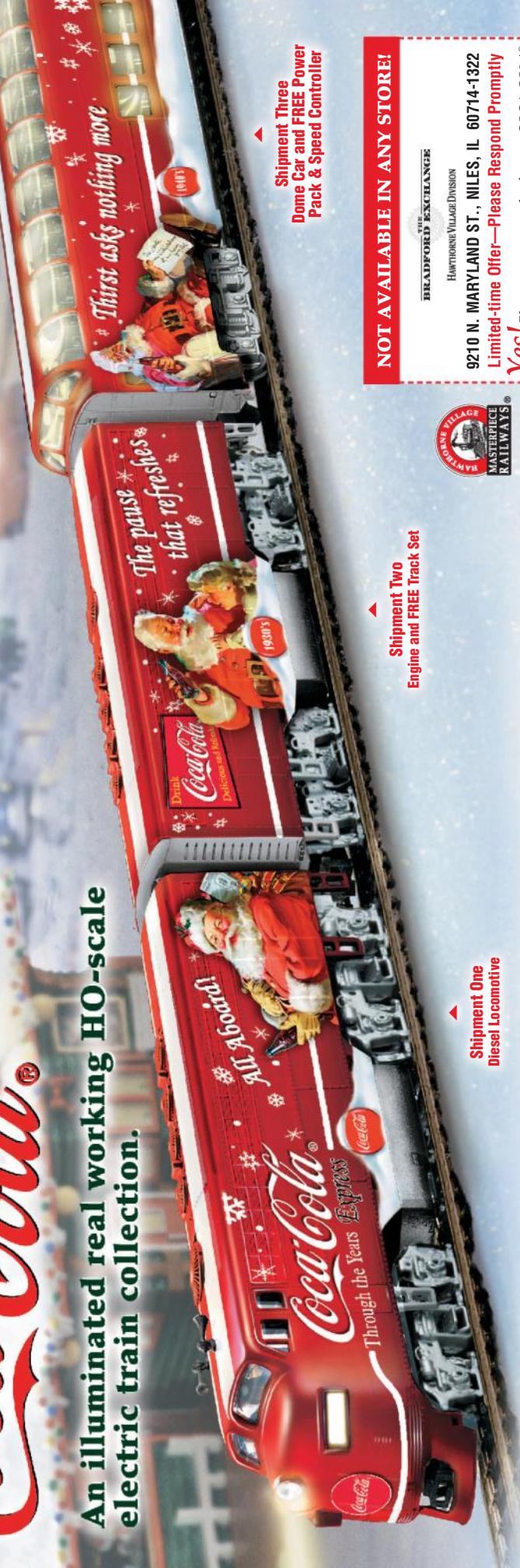
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Best Pro Tips

Expert advice from the job site. By Mark Petersen

WORKING IN THE COLD

Before signing on with *The Family Handyman*, most of the editors here were employed in the building trades. And all of us have worked in Minnesota, where it can get nippy outdoors come winter. Travis Larson even worked in Greenland, where temps plummeted to 40 degrees below zero. We got together (inside) and pooled our favorite tips for staying comfortable and safe while working in the cold.



Have a variety of gloves on hand

Different tasks require different gloves. Tight, thin gloves are perfect for delicate tasks like grabbing hold of small screws or twisting wires. Keep thicker gloves or mittens handy for moving equipment or hauling cold, wet material.

Oversize gloves or choppers like these will fit right over your form-fitting gloves, so you can keep your hands warm all day but slip the outer pair off for short periods to do detail work.



Keep your pants dry and mud free

A pair of leg gaiters is a must-have shield in every proper suit of arctic armor. Leg gaiters keep the outside of your pants dry when you trudge through deep snow. They also keep wind and snow from creeping up the inside of your pants. Leg gaiters are useful in muddy conditions because they protect your pants from your mucky boots, especially when you climb up and down ladders. Plus, they're easy to take off at the end of the day to avoid tracking all that accumulated muck into your vehicle or house. You can get a decent pair for as little as 10 bucks online.

Ice-free planks

It's always a good idea to flip planks on their side or upside down when you leave the job site for the night. That will prevent ice from forming on the walking surface and keep the crew safer the next day. And set planks and ladders on their side when storing them on the ground.



BEST PRO TIPS



Prevent slipping

The ground will get extra slippery in high-traffic areas and where water drips off the roof. Sprinkling sand on the icy spots is a great way to prevent a fall. Keep a 5-gallon bucket of dry sand on hand. It's also wise to spread sand on a slippery plank if you're working when it's snowing.



Dress in layers

This might be "duh" advice, but it's worth a mention because it's probably the most important rule for working in the cold. Weather conditions change constantly during a workday. It might feel 20 degrees warmer on the sunny side of the house or 20 degrees colder when you're exposed to a brisk wind. In order to remain comfortable, you need to be able to make wardrobe adjustments. Wearing just one super-insulated layer will inevitably cause you to sweat when things heat up. And when things cool back down, you'll be wet and shivering like a chilly Chihuahua.

One size does not fit all

If you work in the cold a lot, get yourself a few pairs of boots. The key is to wear the lightest, most comfortable boots that the weather will allow.



REGULAR WORK BOOTS:
Dry weather,
above 45 degrees F

INSULATED WATERPROOF BOOTS:
Wet weather, above
20 degrees F

SUPER-INSULATED WINTER BOOTS:
Above minus 45 degrees F, below 20 degrees F

Dry feet are happy feet

Sweat, rain and snow will cause the inside of your boots to get wet—it's pretty much unavoidable. It's imperative you dry out wet boots overnight. If you go to work the next day with damp feet, you'll be ending work early because of cold feet.

Boot dryers like this are worth their weight in gold. They dry boots evenly and thoroughly but don't overdry them, which can cause the liners to get crusty and reduce their life. They cost less than \$20 online and at sporting goods stores and some department stores. Keeping a pair of dry socks on hand is also smart.



Warm up stuff on your dashboard

When working at a job site with no source of heat other than your truck engine, use your dashboard to dry out gloves, thaw caulking, warm cordless tool batteries, keep your lunch from freezing—you get the idea. Also, on sunny days, try to park the front of your vehicle toward the south. The sun will keep your dash fairly warm even in frigid temps without the motor running.



Defrost a padlock

Sleet and freezing rain can prevent a padlock from opening. Loosen up a frozen lock by warming a can of silicone or light lubricant (see "Warm Up Stuff on Your Dashboard" below) and spraying it into the keyhole and the areas around the shackles. Note to naysayers: Some say that liquid lubricants are bad for locks, but we all have sprayed our padlocks dozens of times, and they have continued to work trouble-free for years.

BEST PRO TIPS



Prevent ladder disasters

When your feet slip out from under you, you'll probably bruise your bum and look around hoping nobody saw you. When the feet of a ladder slip out, you're going to hurt more than your pride. Keep ladders upright on icy ground by digging holes for the feet and flipping the feet back so the spurs poke into the ground.

Don't lose your tools

It's not a big deal when a tool falls out of your pouch—unless you don't know it fell out—and it's snowing. Give yourself a fighting chance to find misplaced hand tools by marking them with a bright-colored spray paint. This is also a good way to identify your tools so they don't wander off with other workers.



Neck gaiters are a must

There's no better accessory to keep your neck warm than a neck gaiter. Buy one long enough that you can pull it all the way up to your eyeballs for those particularly windy or brutally cold days. Forget or lose your gaiter? Many convenience store/gas stations sell cheap stocking caps. Cut a hole in the top and you've got yourself a neck gaiter.



Support sawhorse legs

It's true that frozen ground makes a nice, stable surface for sawhorses. But sawhorse legs can sink into the thawed ground when the temps rise, which will make them unstable. Also, if the legs do sink and the ground refreezes, you're going to need a jackhammer to free them. Place chunks of wood under the legs to keep them on terra firma.

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Swing-out Storage

TRIPLE YOUR CABINET SPACE!

By Jeff Gorton



If your wall cabinets are so full that you can't find anything without constant reshuffling, we have the perfect solution. This swing-out cabinet provides two extra layers of shelving for great visibility and easy access.

We chose to make shallow shelves on the front for spices and wider shelves on the back for bottles or cans, but you can configure your swing-out however you like. Narrow adjustable shelves behind the swing-out provide even more storage space.

Tools and materials

You'll find all the materials for this project at home centers or lumber yards. The plywood has to be cut accurately into the parts for the swing-out, and the 1x3s ripped into 1-in.-wide strips for the shelf edging. A table saw and power miter saw are the best tools for these cuts.

We used an 18-gauge brad nailer and 1-1/2-in. brad nails to connect the parts. But if you don't own a brad nailer, you can use screws or drive finish nails by hand.

Plan the swing-out size

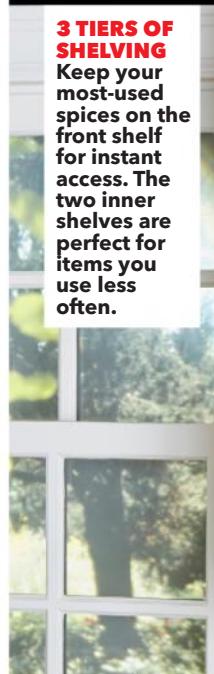
Since there are so many different sizes of wall cabinets, we can't give you an exact plan for building a swing-out to fit in yours. However,

WHAT IT TAKES

TIME	COST	SKILL LEVEL
1 day	\$110*	Beginner to intermediate

TOOLS Table saw, miter saw, hacksaw, drill and 1/4-in. bit, carpentry hand tools. A nail gun is optional.

*Approximately, depending on size.



3 TIERS OF SHELVING

Keep your most-used spices on the front shelf for instant access. The two inner shelves are perfect for items you use less often.



1. MEASURE YOUR CABINET

Measure the height of the opening and subtract 1/2 in. to determine the height of the shelf unit. Also measure the narrowest width from protruding hinges or door parts.



2. CHECK FOR CLEARANCE

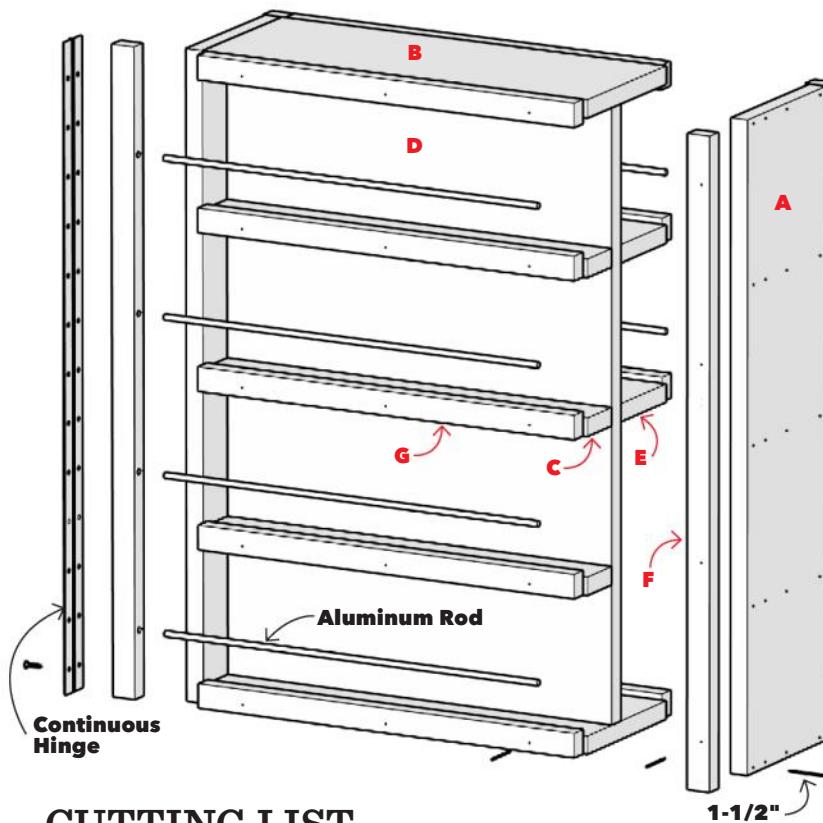
Subtract 2 in. from the width measurement and cut an 8-in.-wide cardboard template to that dimension. Position the template as shown here. If the template won't clear the door or hinges, reduce the length.



3. BUILD A BOX

Assemble the sides, top and bottom with glue and nails. Or, if you use screws rather than nails, you can skip the glue.

Figure A Swing-out Shelf



CUTTING LIST

KEY	QTY.	MATERIAL	DIMENSIONS	PART
A	2	3/4" plywood	3/4" x 6-1/2" x 26-1/2"	Sides
B	2	3/4" plywood	3/4" x 6-1/2" x 17-1/4"	Top/bottom
C	3	3/4" plywood	3/4" x 2" x 17-1/4"	Shallow shelves
D	1	3/4" plywood	3/4" x 25-1/16" x 17-1/4"	Divider
E	2	3/4" plywood	3/4" x 3-3/4" x 17-1/4"	Deep shelves
F	4	3/4" boards	3/4" x 1" x 26-1/2"	Vertical edging
G	9	3/4" boards	3/4" x 1" x 16-7/8"	Horizontal edging
SHELVES AT BACK OF CABINET				
H	2	3/4" plywood	3/4" x 2-3/4" x 27-1/2"	Side supports
J	3	3/4" plywood	3/4" x 2-3/4" x 21"	Shelves
K	2	3/4" boards	3/4" x 1" x 27-1/2"	Vertical edging
L	3	3/4" boards	3/4" x 1" x 20-1/2"	Shelf edging

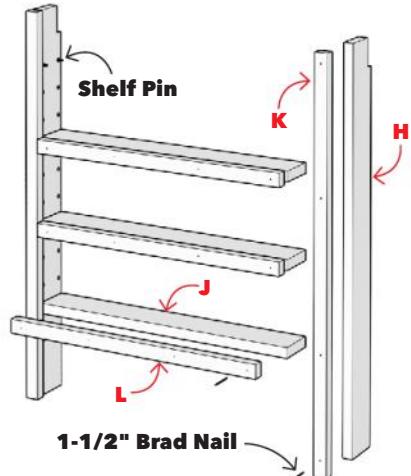
NOTE: These sizes are for a swing-out for a 24-in.-wide wall cabinet. To fit your cabinet, adjust the sizes according to the instructions in the article.

since most wall cabinets are about the same depth, you should be able to make the cabinet 8 in. deep like ours, and you'll only need to adjust the width and height to fit.

Start by measuring the height of the opening (**Photo 1**) and recording the measurement. Subtract 1/2 in. from the height to get the length of the sides (A).

Determining the width is trickier because you have to subtract from the width measurement to compensate for the diagonal width of the swing-out. There are formulas you can use, but it's easier to simply make a cardboard template and adjust the size until it fits. Cut a piece of cardboard 8 in. wide and 2 in. shorter than the width of the cabinet and see if it fits diagonally (**Photo 2**). Trim the cardboard until you have about 1/2-in. clearance. Now measure the cardboard and subtract 1-5/8 in. to determine the length of the top and bottom (B).

Figure B Stationary Shelf



MATERIALS LIST

ITEM	QTY.
3/4" x 4' x 4' plywood	1
1x3 x 8' board	1
1x3 x 10' board	1
36" x 1-1/2" continuous hinge	1
36" x 1/4" aluminum rod	4
1/4" shelf pins	12
Magnetic cabinet catch	1
Small package of 1-1/2" brad nails	1

Build the carcass

Start by cutting out the sides, top and bottom and nailing them together (**Photo 3**). Then determine your shelf spacing and nail in the shallow shelves (C). Leave enough space for your tallest spice containers. We spaced our shelves about 5-1/2 in. apart.

Next, measure the inside height and width dimensions and cut the interior plywood divider (D) to fit. Press the divider against the shallow shelves and nail through the sides to hold it in place (**Photo 4**). Flip the carcass over and measure from the face of the divider to the edge of a side to determine the width of the deeper shelves (E) on the back of the swing-out. We added two shelves, leaving one tall space for bottles, with two shorter spaces above. If you have a lot of bottles, you could simply divide the space in half and install only one shelf. Cut the shelves to fit and nail them in.

When the plywood carcass is finished, install the 1-in.-wide solid wood edging. After ripping the boards to 1 in. wide, cut the vertical pieces (F) to length, mark the hole locations and drill holes for the rods (**Photo 5**). Then nail the vertical edging pieces to the carcass, letting them hang over the outside edge about 1/16 in. (the width of a quarter; **Photo 6**). Cut the horizontal edging pieces to fit between the vertical pieces and nail them in. Install these with the bottom edges flush to the plywood to create a 1/4-in. lip on the top of the shelf. Repeat this process on the opposite side to complete the swing-out construction.

Apply finish and install the swing-out

We used spray cans of polyurethane to finish our swing-out before installing it. Cover the aluminum rods with masking tape. Then apply several light coats, sanding the dried polyurethane with 400-grit sandpaper between coats.

Cut a continuous hinge to the height of your swing-out cabinet



4. INSTALL THE DIVIDER

Position and nail the narrow shelves. Measure the inside width and height of the swing-out and carefully cut the 3/4-in. plywood divider to fit. Drop the plywood divider into place and nail through the sides, top and bottom to hold it. Flip the carcass over and install the wider shelves.



5. DRILL HOLES FOR THE RODS

Set one edging piece on the swing-out and mark the rod positions 2 in. above each shelf. Drill 1/4-in. holes in the center of the edging at each mark. Use this as a pattern to mark and drill the opposite edging piece.



6. ADD THE EDGING AND RODS

Nail on the first edging piece. Then install the rods and nail on the second vertical edging. Measure and cut the horizontal edging boards. Glue and nail the edging to the carcass. Repeat on the opposite side.



7. ATTACH THE CONTINUOUS HINGE

Cut a continuous hinge to the height of the swing-out using a hacksaw with a fine-tooth blade. Position the hinge so that it can fold over the front of the swing-out and drive a screw at the top and bottom. Then drive the remaining screws.



8. HANG THE SWING-OUT

Prop up the swing-out so that there's equal space on the top and bottom. Align the continuous hinge with the front of the hinge pin (the rod-shaped center section) flush to the cabinet face. Attach the hinge with the small screws provided.



9. ADD ADJUSTABLE SHELVES

Cut the shelf supports and shelves to fit. Add the edging strips and drill the shelf-pin holes. Then screw the shelf supports to the side of the cabinet and drop in the shelves. Screw a magnet to a block of wood at the top of the cabinet.

with a hacksaw. Determine which side of the swing-out is opposite the cabinet door and mount the hinge to this side (Photo 7). Photo 8 shows how to attach the swing-out to your wall cabinet.

Finish up with more shelves

Install shelves at the back of the cabinet. Measure the depth of the cabinet and subtract 8-1/4 in. to determine the depth of the shelves. Subtract 3/4 in., the thickness of the edging, from this dimension to determine the width of the plywood sides and shelves.

Cut two strips of plywood for the sides, and cut as many shelves as you want. Cut the side supports (H) to fit top to bottom in the cabinet. Then drill a series of 1/4-in. holes in the plywood sides for shelf pins. Use a shelf-pin jig or a strip of pegboard with 1/4-in. holes as a drilling guide.

Figure B shows how to install the edging pieces on the shelves and side pieces. Finish up by screwing the side shelf supports to the sides of the cabinet and installing the shelves. Mount a magnetic catch to the top of the wall cabinet to hold the swing-out in place.

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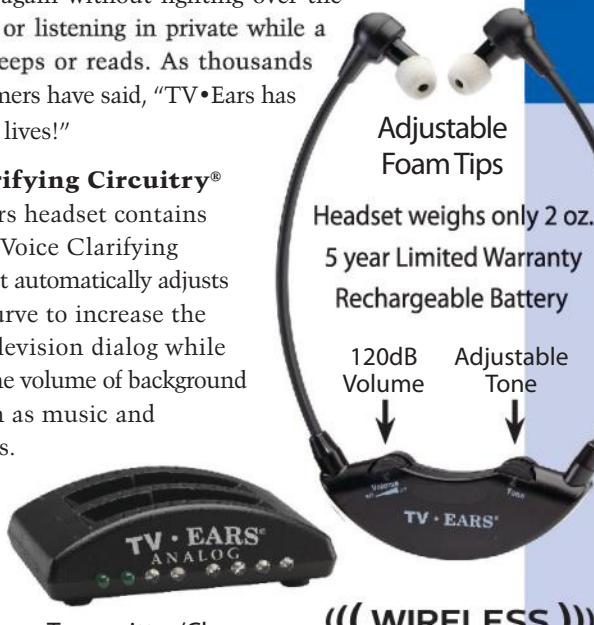
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NO MORE DIGGING FOR THE RIGHT LID!

BY JEFF GORTON

It's always a challenge to find matching containers and lids. This rollout solves the problem by keeping them all neatly organized and easily accessible. The full-extension drawer slides are the key.

To simplify tricky drawer slide installation, we've designed an ingenious carrier system that allows you to mount the slides and make sure everything is working smoothly before the unit is mounted in the cabinet.



Tools and materials

Our 24-in. base cabinet required a 4 x 4-ft. sheet of 1/2-in.-thick plywood for the rollout, plus a 2 x 3-ft. scrap of 3/4-in. plywood for the carrier. Yours may require more or less. We found high-quality birch plywood at a home center for this project. If you have trouble finding nice plywood, consider ordering Baltic birch or ApplePly plywood from a home center or local lumberyard. The carrier fits under the rollout and isn't very conspicuous, so almost any flat piece of 3/4-in. plywood will work for that.

In addition to the lumber, you'll need a pair of 22-in. full-extension ball-bearing slides (about \$22 at home centers or woodworking supply stores) and a 1/4-in. aluminum rod.

We used a table saw to cut the plywood parts, but if you're careful to make accurate cuts, a circular saw will work. You'll need a jigsaw with a plywood-cutting blade to cut the curves on the sides and dividers. We used a finish nail gun and 1-1/4-in.-long brad nails to connect the parts, but you could substitute trim-head screws if you don't mind the larger holes they leave.

Measure the base cabinet

Most base cabinets are about 23 in. deep and will accommodate this rollout, but measure yours to be sure. If the measurement from the back of the face frame to the back of the cabinet is less than 22 in., you'll have to build a shallower rollout and use shorter drawer slides.

WHAT IT TAKES

TIME	COST	SKILL LEVEL
1 day	\$65	Beginner to Intermediate

TOOLS Table or circular saw, jigsaw, drill and 1/4-in. bit, hand tools. A brad nail gun simplifies the construction.



1. MEASURE THE OPENING

Measure from any protruding hinges or door parts to the opposite side to find the opening width. Also check to make sure the cabinet is at least 22 in. deep.



2. CUT THE SIDE PANELS

Cut each panel to size. Then cut the notch to form the L-shape. Start with a table saw or circular saw for the straight cuts. Finish the inside corner with a jigsaw.



3. CUT THE CURVES

Mark the curves on the side panels by tracing along a gallon paint can. Mark the dividers using a quart-size paint can. Then cut with a jigsaw.



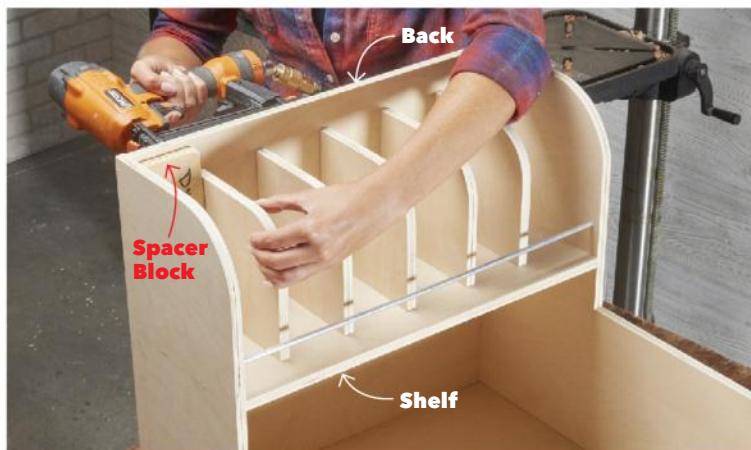
4. ASSEMBLE THE ROLLOUT

Glue and clamp the parts together. Don't forget to install the rod. Align the edges by tapping on the panels with your hand or a hammer. Then nail the parts together.



5. NAIL THE DIVIDERS TO THE SHELF

Cut a spacer the width of the desired space between dividers and use it to position the dividers as you nail them to the shelf.



6. NAIL THE DIVIDERS TO THE ROLLOUT

Position the shelf and nail through the sides into the shelf. Then use the spacer block to align the dividers and nail through the back.

The other critical measurement is the width. Measure the clear opening width; that is, the width from any protruding hinge or door parts to the opposite side of the cabinet opening (**Photo 1**). Subtract 3 in. from this measurement to determine the width of parts B, C, D and E.

Cut out the parts

After adjusting the size of parts B, C, D and E for the cabinet width, you can cut out all the parts except the carrier bottom. If you're using a table saw, make partial cuts to form the L-shaped sides. But remember, you can't see how far the blade is cutting on the underside, so be sure to stop short of your inside corner marks by at least an inch. **Photo 2** shows how to complete the cut with a jigsaw.

Trace along the edge of a 1-gallon paint can to draw the radius for the curve on the side panels. Trace along a quart-size can to draw the radius on the dividers. Cut the curves on the sides and dividers with a jigsaw (**Photo 3**). Smooth the curved cuts with 100-grit sandpaper.

Build the rollout

Mark the location of the 1/4-in. rod on the side panels using **Figure A** as a guide. Wrap tape around a 1/4-in. drill bit 1/4 in. from the end to use as a depth guide while drilling. Drill 1/4-in.-deep holes at the marks. Use a hacksaw to cut an aluminum rod 1/2 in. longer than the width of the bottom.

Apply wood glue to all edges that meet, and arrange the sides, bottom, front and back on a workbench and clamp them together. Work the aluminum rod into the holes. Tap the parts with a hammer to align the edges perfectly before connecting them with brad nails (**Photo 4**). Take your time aiming the nail gun to avoid nail blowouts.

Finish the rollout by adding the dividers. First decide how many dividers you want and calculate the width of the space between the dividers. Cut a spacer block to that dimension and use it as a guide to install the dividers. Attach the dividers to the shelf (**Photo 5**). Then measure down 7-1/2 in. from the top and make marks to indicate the top edge of the divider shelf. Line up the divider assembly with these marks and nail it in. Draw divider center lines on the

back of the rollout as a nailing guide. Then attach the dividers (**Photo 6**).

Drawer slides require 1/2-in. clearance on each side, so making the carrier exactly 1 in. wider than the rollout will result in a perfect fit. Measure the width of the completed rollout and add exactly 1 in. to determine the width of the carrier bottom. Cut the carrier bottom from 3/4-in. plywood. Then screw the carrier sides to the carrier bottom to prepare the carrier for mounting the drawer slides.

Mount the slides

Follow the instructions included with your drawer slides to separate the slides into two parts: a channel and a rail. Usually, pressing down on a plastic lever releases the parts and allows you to separate them. Screw the rails to the drawer (**Photo 7**) and the channels to the carrier sides (**Photo 8**).

When you're done installing the slides, check the fit by carefully aligning the rails with the channels and sliding them together. The rollout should glide easily on the ball-bearing slides. If the slides seem too tight, you can adjust the fit by removing one of the carrier sides and slipping a thin cardboard shim between the carrier side and carrier bottom before reassembling them.

Mount the rollout in the cabinet

Photo 9 shows fitting the carrier assembly into the cabinet. There will be a little side-to-side play, so you can adjust the position to clear the hinge and door. This will probably require you to offset the carrier slightly away from the hinge side. Screw the carrier to the bottom of the cabinet and you're ready to install the rollout (**Photo 10**). Since you've already checked the fit, it should operate perfectly. Now load it up with containers and lids and enjoy your neatly organized container rollout.

MATERIALS LIST

ITEM	QTY.
1/2" x 4' x 4' plywood	1
3/4" x 2' x 3' plywood	1
Pair of 22" full-extension slides	1
36" x 1/4" aluminum rod	1
Small package of 1-1/4" brad nails	1

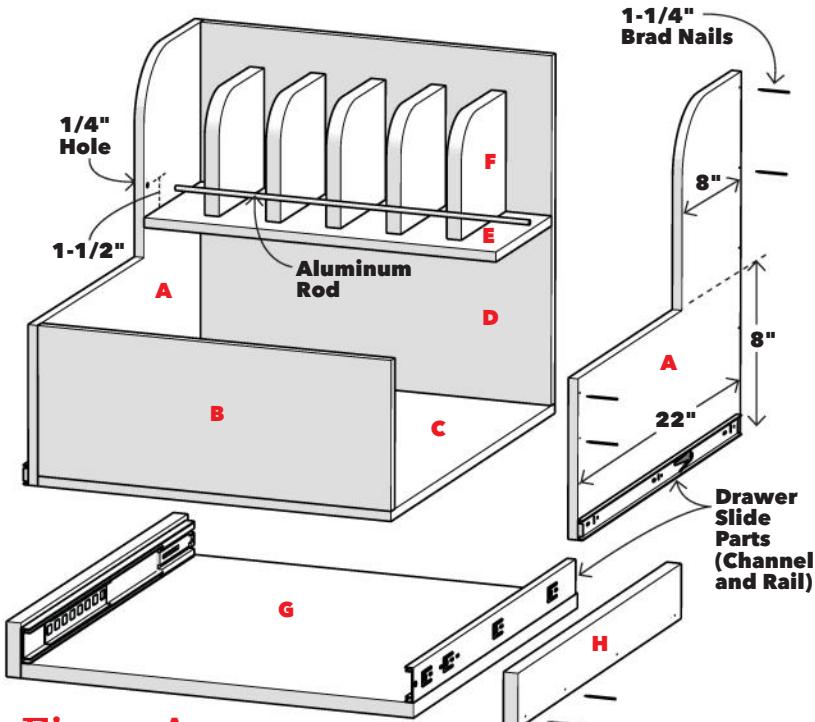
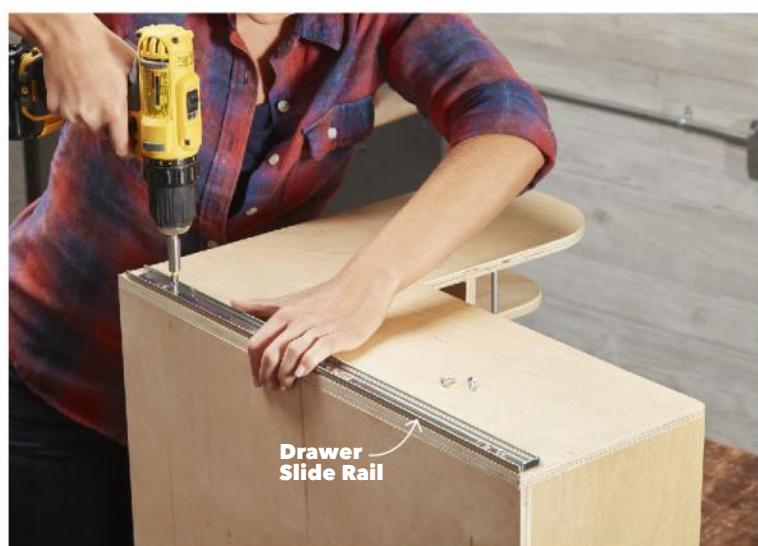


Figure A

CUTTING LIST

KEY	QTY.	MATERIAL	DIMENSIONS	PART
A	2	1/2" plywood	1/2" x 22" x 18"	Sides
B	1	1/2" plywood	1/2" x 7-1/2" x 18"	Front
C	1	1/2" plywood	1/2" x 22" x 18"	Bottom
D	1	1/2" plywood	1/2" x 17-1/2" x 18"	Back
E	1	1/2" plywood	1/2" x 7-1/2" x 18"	Shelf
F	5*	1/2" plywood	1/2" x 6" x 6"	Dividers
G	1	3/4" plywood	3/4" x 20" x 22"	Carrier bottom
H	2	3/4" plywood	3/4" x 2-3/4" x 22"	Carrier sides

Note: These sizes are for a 24-in.-wide base cabinet. To fit your cabinet, adjust the sizes according to the instructions in the article.



7. SCREW THE DRAWER SLIDE TO THE ROLLOUT

Separate the drawer slides and attach the rail to the rollout. Align the rail flush to the bottom and flush to the front before driving the screws.



8. SCREW THE DRAWER SLIDE CHANNEL TO THE CARRIER

Rest the drawer slide channel on the carrier and align the front flush to the front of the carrier side.



9. INSTALL THE CARRIER

Position the carrier so that the rollout will clear any hinge or door parts. Drive screws through the carrier bottom into the cabinet.



10. INSTALL THE ROLLOUT

Line up the rails and channels and slide the rollout into the cabinet. Slide it back and forth a few times to make sure it rolls smoothly.

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— J. Fitzgerald, VA



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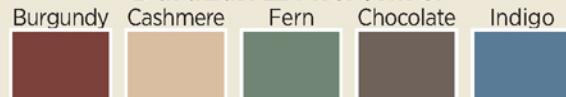
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2018 BEST IN DIY

CORDLESS CIRCULAR SAWS

They offer the ultimate in cutting convenience. But can they do the job?

By Tom Caspar



We've used cordless circular saws for years and love them. With battery and motor technology improving rapidly, we wondered if the latest generation of saws was approaching the performance of corded models. So we put them to the test. Here's what we learned.

The bottom line on performance:

While there's still a performance gap between corded and cordless saws, most cordless models now have the cutting power to handle just about any job. We even found one (Makita's XSR01) whose power rivals that of a corded saw.

Is cordless right for you?

If you're in the market for your first circular saw, we think a corded saw is still the best choice. But if you're an active DIYer or pro, adding the convenience of a cordless model makes sense.



Note the blade side

Left or right? The blade on most corded saws is on the right as you push the saw forward; on many cordless saws, it's on the left. Either way is OK with us on a cordless saw—you just adapt. In any case, many are so lightweight that you can drive them with either hand.



Bare tool or kit?

Saws sold as "bare tools" don't come with a battery or charger. If you already have a cordless tool, you may find a bare saw that uses the same battery. That cost savings alone might determine which brand you should buy. Some brands offer more than one model that can take the same battery, so look at all the features before you decide which saw to buy.



Can you find blades?

Home centers and hardware stores stock a selection of 7-1/4-in. blades, but not so many 6-1/2-in. blades—in fact, they might not have any at all. Smaller blades are even harder to find in stores.



Brushless motors are better

More and more tools are labeled "brushless motor." And that designation isn't just marketing hype. With brushless motors, we saw noticeably more power and run-time. Besides using battery power more efficiently, brushless motors last longer and weigh less than standard motors.

Rpm matters

The saws we tested carry rpm ratings ranging from 3,500 to 5,800. By comparison, corded saws range from 5,200 to 6,200 rpm. Not surprisingly, we found that a higher rpm means faster cutting.

Voltage means power

The voltage rating is a good indication of cutting power; a 20-volt saw will have more guts than a 12-volt saw. But voltage isn't a perfect indicator. The difference between two saws with the same voltage is sometimes noticeable.



A fuel gauge prevents regrets

A battery level indicator tells you how much "fuel" is left in the tank—so you won't discover your battery is dead after you've climbed up on the roof.



20V = 18V

Some saws carry a 20-volt label, which might lead you to believe that they're more powerful than 18-volt saws. They're not. The 20-volt rating is for their "initial battery voltage," measured without a workload. Their actual rating is 18 volts.

Work lights are handy

We thought it was a gimmick but soon came to love "headlights" on saws. They make it easier to follow the cutting line in low-light conditions.





How deep are you cutting?

For safety and best performance, manufacturers recommend that the blade should cut 1/4 in. deeper than the material. We're used to setting depth-of-cut by eye, but we also like saws that have an easy-to-read depth scale. Setting them is a cinch.

Run-time is tricky

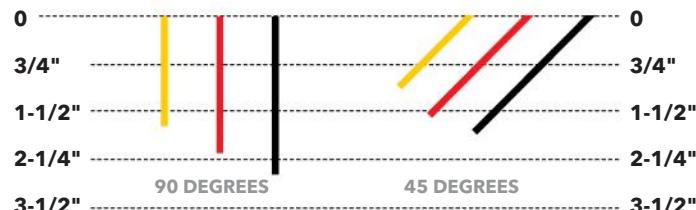
Run-time, which is how long a tool can run before the battery dies, is almost impossible to determine under real-world conditions. It depends on how hard the saw is working. That said, there are two battery ratings that can help: amp-hours and watt-hours. Basically, they tell you how much power a battery can store. We give the watt-hour ratings on p. 52. **Note:** We used batteries with the highest ratings available. They're larger, heavier and more expensive than other batteries that fit the same tool.

Run-time may not matter

If you have a second battery and a fast charger, don't get hung up on run-time. Some "rapid" chargers refill batteries in as little as 15 minutes. On most jobs, that's quick enough to give you a charged battery and keep you working.

Maximum depth of cut

We tested cordless saws with three blade sizes: 5-3/8 in., 6-1/2 in. and 7-1/4 in. Here's how deep, on average, each saw cuts at 90 and 45 degrees.



5-3/8"



6-1/2"



7-1/4"

Models We Tested



Ryobi P507

6-1/2" \$69

Weighing only 6.5 lbs., this is one of the lightest saws we tried. It was easy to control with either hand and easy to handle on a vertical surface. Its shoe isn't very large, but that's what you'd expect from such a super-compact saw.



DeWalt DC390B

6-1/2" \$99

This saw is light in weight, so it's easy to maneuver, and it has a relatively large shoe. The battery we used has a short run-time, though, and the motor is on the slow side.



Ridgid R8652, R8653

7-1/4" \$119

The 52 has a brush motor and weighs 1-1/2 lbs. more than the brushless 53. These are the least expensive 7-1/4-in. saws that have a fuel gauge, a work light and an easy-to-read depth scale. Both models have plenty of power. Their two handles are offset, which can feel awkward if you're a lefty.



Milwaukee 2731-20

7-1/4" \$199

This saw has all the features we like plus the extra capacity of a 7-1/4-in. blade. And if you're used to a corded saw, the blade is on the usual side—the right.

EDITORS' CHOICE
2018
BEST OVERALL



DeWalt DCS575B

7-1/4" \$149

This saw has plenty of power. Equipped with an oversize 20V battery, it also has a long run-time—which you may need, because this saw will perform well on virtually any job. The blade is on the right, the same side as on most corded saws, so you'll feel right at home when you use it.

EDITORS' CHOICE
2018
BEST OVERALL



Makita XSR01

7-1/4" \$199

This saw differs from the others in several ways: It takes two 18V batteries and delivers awesome power and exceptional run-time. Of all the saws we tried, it performed most like a corded saw. It's also large and heavy. It's a great tool for big, tough jobs, but maybe not your best choice for standard duty.

IN A
CLASS BY
ITSELF



Bosch CCS180B

6-1/2" \$119

Featuring a heavy-duty aluminum shoe and a dust blower, this saw performs well in cutting 3/4-in. plywood and miters. You have to remove the battery to check its charge, however.



Porter-Cable PCC660B

6-1/2" \$60

This was the least expensive saw we tried, but it still did a decent job of cutting through 2x4s and ripping plywood. We did have trouble installing the blade, though.



Milwaukee 2630-20

6-1/2" \$120

Costing just under \$100, this saw has a larger shoe than you'll find on less-expensive models, which is great for better balance. Its motor spins relatively slowly, however.



DeWalt DCS391B

6-1/2" \$119

Equipped with a fast motor and an extra-large 20V battery, this saw cruised through our 3/4-in. plywood and 45-degree miter tests. The battery has an extra-long run-time, but the larger size makes the tool heavier than most other 6-1/2-in. saws.



Milwaukee 2530-20

5-3/8" \$149

This lightweight, compact saw is great for 3/4-in. material, but it packs only 12 volts and tends to bog down in thicker stuff. You can't beat it for one-handed sawing in awkward places, however. Its run-time is short, but this saw has a nice set of features: a brushless motor, a fuel gauge and a work light.

NOTE: Prices shown do not include battery and charger.

The Cordless Circular Saw Test

We crosscut a 2x8 and ripped 3/4-in. fir plywood, tracking cutting speed and run-time for each saw. For the toughest test, we tilted the blade of each saw to 45 degrees and crosscut bevels on 2x10s.

CIRCULAR SAW SPECS

Make and Model	Blade Size	Voltage	Run-Time (Watt-Hours)	Weight w/Battery (Lbs.)	Rpm	Blade Side	Brushless	Fuel Gauge	Work Light	Easy Depth Scale
Bosch CCS180B	6-1/2"	18	113	8.5	3,900	L		✓		
DeWalt DC390B	6-1/2"	18	36	7	3,700	L				✓
DeWalt DCS391B	6-1/2"	20	120	8.5	5,150	L				✓
DeWalt DCS575B	7-1/4"	20	120	10.25	5,800	R	✓	✓	✓	
Makita XSR01	7-1/4"	36	180	12.5	5,100	L	✓	✓		✓✓
Milwaukee 2530-20	5-3/8"	12	43	6.5	3,600	L	✓	✓	✓	
Milwaukee 2630-20	6-1/2"	18	90	9	3,500	L		✓		✓
Milwaukee 2730-20	6-1/2"	18	90	8.5	5,000	L	✓	✓	✓	✓
Milwaukee 2731-20	7-1/4"	18	90	9.5	5,000	R	✓	✓	✓	✓
Porter-Cable PCC660B	6-1/2"	20	80	7.5	4,000	L				
Ridgid R8652	7-1/4"	18	108	11.5	3,700	R		✓	✓	✓✓
Ridgid R8653	7-1/4"	18	90	10	3,800	R	✓	✓	✓	✓✓
Ryobi P507	6-1/2"	18	72	6.5	4,700	L		✓		✓✓

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REDISCOVER THE DOWEL JIG

Strong, simple joinery never goes out of style. By Tom Caspar

If you think pocket screws and biscuits have put dowel jigs out to pasture, think again. I love pocket screws and biscuits, but dowels offer a combination of strength, simplicity and accuracy that can't be beat. That's why most furniture is still manufactured with dowels.

For less than \$50, you can buy a self-centering jig that can make joints as well as a machine can. All you need is a drill.

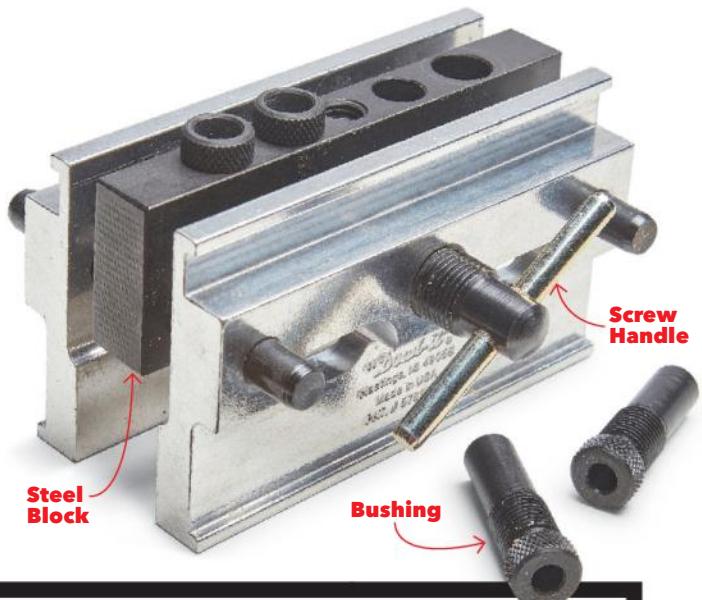
MEET THE EXPERT
Tom Caspar is a professional furniture maker and the former editor of *American Woodworker* magazine.

HOW IT WORKS

The heart of the jig is a steel block with holes to guide your drill bit. On many models, the holes are threaded, which lets you install bushings for drill bits of various sizes. The holes are precisely perpendicular and located in the exact center of the block.

Center lines for each hole are scribed on the side of the block. They're visible through two windows.

A screw runs through the whole block. Turning the screw's handle moves both sides of the jig an equal amount as it clamps onto the wood. That's why the jig is "self-centering": Clamping the jig centers the holes on the wood automatically.



HOW TO MAKE A JOINT



1 Mark the parts

Position the parts and mark the dowel locations with a pencil. We're showing a T-joint here, but most joints require the same steps.



2 Match up the lines

Align your pencil lines with the center lines on the jig's block. Tighten the screw to clamp the jig into place and then drill the dowel holes.



3 Presto!

Add dowels and glue for a fast, strong, perfectly aligned joint.

CHOOSING A JIG

Various manufacturers make self-centering dowel jigs. At first glance, they all seem the same. But there are little differences that matter a lot.

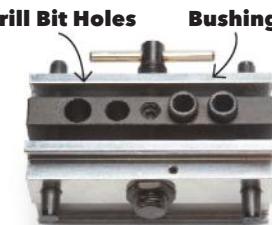
PRO ADVICE You'll find dowel jigs in various styles, and some carry tempting price tags. But they're often flimsy, inaccurate or just hard to use. Every woodworker we talked to prefers the classic self-centering style shown here.

SHOP ONLINE Woodworking stores and some home centers stock dowel jigs. But start your search online, where you'll find the widest selection.



THE BASIC MODEL (\$25 TO \$40)

The most basic jigs have holes sized for various drill bits (no bushings). If you want to use more than one dowel in a joint, you have to move the jig. That can lead to alignment problems, so choose this type only if you're on a tight budget.



BUSHINGS ARE BETTER (\$40 TO \$60)

Some jigs come with bushings of various sizes that screw into threaded holes. That lets you drill holes of the same size without moving the jig. This model has two bushing holes and two drill bit holes that don't accept bushings.



MORE BUSHING HOLES IS EVEN BETTER (\$50 TO \$75)

This model has four threaded holes. That gives you more options for spacing between holes, and you could drill four holes without moving the jig. Extra bushings are sold separately.



EXTRA CAPACITY IS NICE (\$60 TO \$90)

The other jigs shown here can clamp onto stock up to 2-3/8 in. thick. That's almost always enough. But wide-capacity jigs handle stock of 6 in. or more.

MAKE A VERTICAL T-JOINT

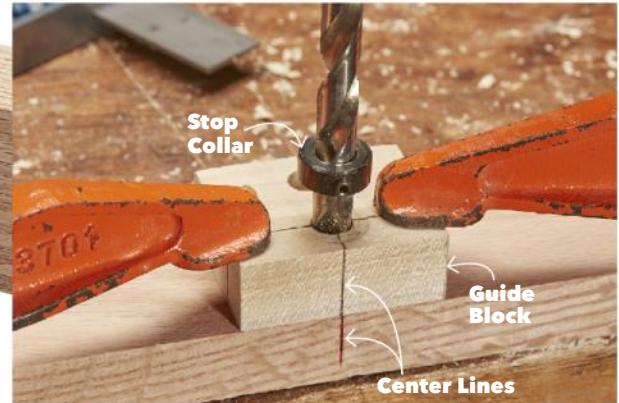
A self-centering jig isn't designed to make side-by-side holes in the face of a board (as shown in part A). But you can do it. Here's the trick: Use the jig to make a guide block. The block itself will then act as a jig to position the holes. To start, measure how far your jig will open, then cut a block that length. Mark a center line on the block.

The rest is shown here. Dowel the end of part B using your dowel jig.



1 Make a guide block

Drill two holes through a block, using the jig to position the holes perfectly.



2 Drill through the block

Align the block's center line with the joint's center line.

TIPS

CHOOSE A STANDARD BIT

A twist bit with an aggressive design is intended to cut fast, but that's not good for a doweling jig. An aggressive bit can grab the wood, pulling itself too hard and too deep, even causing the stop collar to slip. A twist bit with a standard shape is much better. A brad point bit is OK too.



ADD A SCRAP

When drilling into the end of a part, place a scrap of the same thickness next to it. This keeps the jig straight while you tighten it. A small pipe makes tightening easier.

MAKE BETTER EDGE JOINTS

Dowels are a big help when you're edge-gluing boards; they keep the boards aligned and flush. They also strengthen a joint that's not perfectly tight.



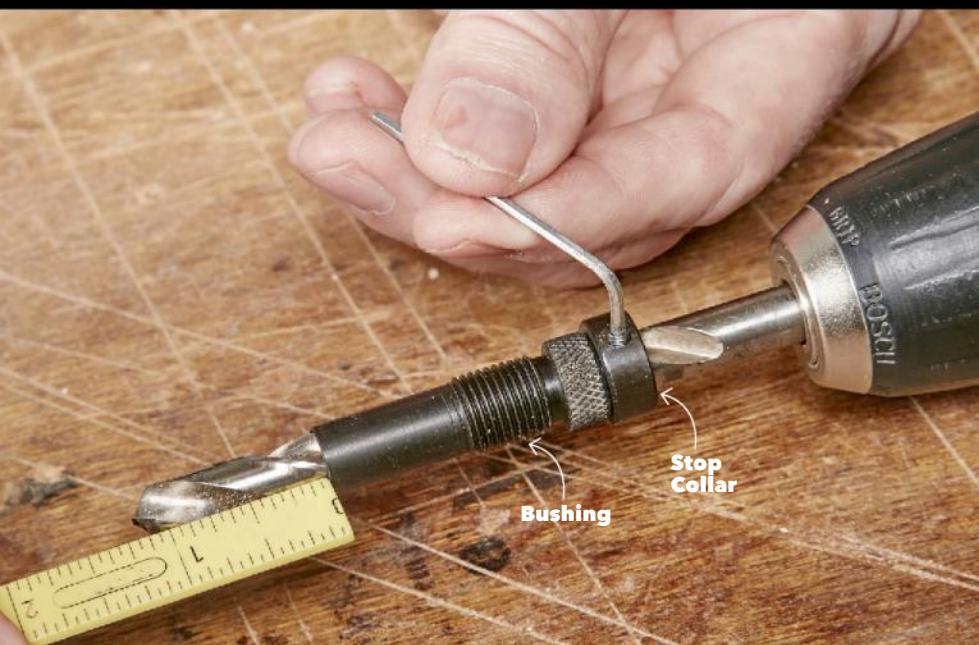
1 Mark dowel locations

Cut the boards 1 in. extra long and butt them together. Mark dowel center lines 2 in. from each end and 8 to 12 in. apart in between.



2 Drill dowel holes

Align the jig with the center lines and drill. Control the hole's depth using a stop collar. Glue dowels into one set of holes. Measure how far each one sticks out; cut any that are too long. Glue the boards together, then cut them to final length.



SET A STOP COLLAR USING A BUSHING

When you buy a doweling jig, pick up a set of drill bit stop collars (\$3). A collar prevents you from drilling too deep, which can be a disaster.

The easiest way to position a collar is by using one of the bushings from your jig. Measure to the beginning of the bit's tip, not to the pointed end. Add 1/16 in. to allow space for glue at the bottom of the hole. This bit is set up to drill a hole 1-1/16 in. deep, perfect for a 2-in. dowel.



DON'T MAKE DOWELS; BUY THEM

Manufactured dowels with ribbed sides are much better than dowels made at home from smooth dowel rod.

Fluted dowels are stronger, fit better and are easier to glue.

When you clamp a joint together, excess glue in the hole flows up and out of the flutes. Fluted dowels are available for about \$2 for 20 at home centers.

MAKE AN L-JOINT

Two boards joined as an "L" make a great table leg or box corner. Glue alone will make the joint plenty strong, but dowels provide perfect alignment.



1 Make a guide

Cut a scrap the same length as your workpieces and mark one end with an "X." Drill holes through the scrap using the dowel jig.



2 Drill the face side

Clamp the guide to the face of part A and drill. Remember to align the "X" with the top of the part.



3 Drill on edge

Drill matching holes in the edge of part B, again aligning the "X" with the top.

TIPS

APPLY GLUE WITH A SMALLER DOWEL

Before inserting a dowel, coat the inside of each hole with glue using a 5/16-in.-diameter craft stick. Apply more glue to the surfaces around the holes and to the dowel pins with a small brush.



THE THREE-HOLE TRICK

If your jig has two bushings, here's a trick for drilling three, four or more holes exactly the same distance apart. Drill two holes, then move the jig and drop a bolt through one of the bushings and into a hole. (The bolt must be the same diameter as the bushing.) Clamp and drill through the empty bushing. To make the best indexing pin, saw the threaded end off a 3-1/2-in.-long hex bolt. This leaves just a smooth shaft of the perfect diameter.

MAKE AN OFFSET JOINT

Usually, you want dowels in the center of a part, as in part A on the right. But sometimes you don't, as in part B. Well, you can fool your self-centering jig into making a joint that isn't centered. All you have to do is add a spacer block. Determining the precise width of the block is a little tricky, so test your setup on scraps before you drill the actual parts. You'll need an extra-wide jig if part B is more than 1-1/2 in. thick.



1 Add a spacer block

Position dowel holes off-center by placing a block against the workpiece. Then drill the holes as usual.



FILE IF THE FIT IS TIGHT

The spacing between holes must be precise for two parts to fit together. If you find the spacing isn't quite right, file one side of a dowel pin to make it skinnier. Put a few layers of tape under the file so you don't mar the wood.



IMPROVE THE HANDLE

The short handle on a doweling jig can dig into your hand when you loosen or tighten the jig. One solution is to use a cheater pipe (see p. 56), but here's a better one: Add round knobs (\$4 each at a hardware store). Cut threads on the handle using a 1/4-20 die.

Quick & Easy CABINET DOORS

**A table saw is
all you need!**
By Tom Caspar

If you've got a table saw, here's a new way to put it to work: making cabinet doors. You don't need any special jigs—just your saw, large or small, a miter gauge and a sharp blade. And you don't need any specially prepared wood; material from a home center will be fine.



MEET THE EXPERT

Tom Caspar has been a professional woodworker and custom furniture builder for more than 40 years.



Choosing the wood

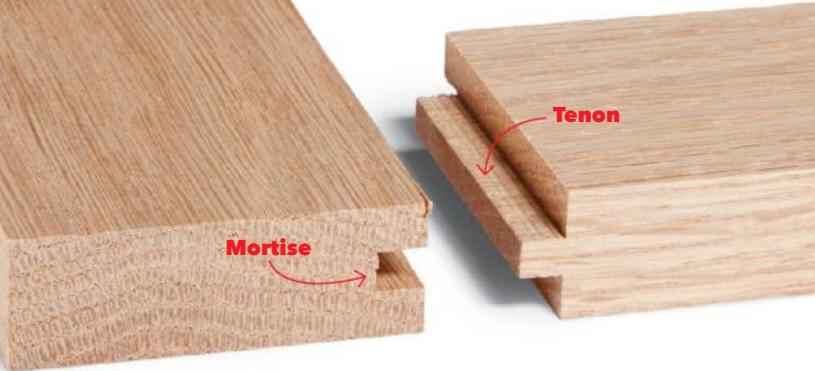
Plan to use 1x3 or 1x4 hardwood boards for the door's frame. You'll find this material at most home centers and lumberyards. These are just nominal dimensions, of course. The actual dimensions will be $3/4 \times 2-1/2$ in. or $3/4 \times 3-1/2$ in.

Store-bought wood has very straight and square edges. For the best results, use the wood in the widths it comes in. Narrower boards ripped from wider ones have a good chance of warping, a problem you won't be able to fix. Plus, you'll have a hard time making the new ripped edge smooth, square and crisp, which you'll need for tight joints. Be picky when you choose your wood. Sight down each piece to make sure it's flat and straight. If it's not, your door won't be flat or straight either, and it *certainly* won't close right!

For the panel, look for 1/4-in. plywood that lies flat, but don't worry if it's not exactly 1/4 in. thick.

A MORTISE-AND-TENON JOINT WITHOUT ALL THE FUSS

Here's a classic way to put together a strong, good-looking door without making any unsightly holes.



Using this technique, that won't matter. You'll adjust the width of the grooves to fit the plywood.

Sizing your doors

It's a good idea to make your doors 1/8 in. extra tall (so you can trim their ends after gluing). Make a list of the parts of your doors before you begin. For each one, you'll

need two stiles (the vertical parts), two rails (the horizontal parts) and one panel. Figuring the length of the stiles is easy. Take the height of the door you want and add 1/8 in. Figuring the length of the rails is more complicated. First, measure the total width of two stiles placed side by side. Subtract this number from the width of the door you

Figure A Frame-and-Panel Door

The panel and tenons both fit into the same groove.





BE SAFE!

You'll have to remove the guard from your saw for several steps. Be careful, and be sure to replace your guard when you're done.

1. SET UP YOUR MITER GAUGES

Adjust your miter gauge to 90 degrees and fasten a wood fence to it. I use two miter gauges to make sure the fence won't wiggle when slid back and forth.



2. CUT PARTS TO LENGTH

Saw a fresh slot through the fence. Measure from the slot to a block in order to cut the door's parts to length.



3. MARK THE PARTS

Assemble the door's stiles and rails. Draw the four sides of a "cabinetmaker's triangle" to identify which part goes where.

want. Then add 1/2 in., the length of two tenons (see **Figure A**).

You'll also need at least two extra "test" pieces the same thickness as your rails and stiles. For your safety, they should be at least 12 in. long.

It's best to cut the plywood panel extra large at first. Rip it 1 in. wider than the length of the rails and 1 in. shorter than the length of the stiles.

Cut the rails and stiles

To build a square door, the stiles and rails must all be exactly the same length with perfectly square ends. A table saw makes that easy.

The simplest method is to use the miter gauge that came with your table saw. Attach a straight 24-in.-long hardwood 1x3 for more accuracy and to avoid splintering out the end of the cut. This fence also provides a place to clamp stops (**Photo 1**). The fence should be about 2-1/2 in. tall and 24 in. long.

A better method is to use a second miter gauge. When you tie two miter gauges together with a fence, the pair will function as a table saw sled. You'll get perfectly straight, square cuts every time. (You can buy a second miter gauge for less than \$20 online. The brand shouldn't matter—most are made to fit 3/4-in. slots.) Use a combination square (**Photo 1**) to set the miter gauges at 90 degrees.

The best way to cut duplicate parts is to use a "stop block" (**Photo 2**). It's just a square block with the corner nipped off to prevent dust buildup. Cut a fresh slot in the fence, then measure from the slot to the block to set up each cut. Clamp the stop block to the fence. A small C-clamp works well because it won't wiggle loose like some other clamps.

Precut your stiles and rails 1 in. extra long so they're easier to handle. To cut them to the exact length, first place the part on the

left side of the fence. Cut about $1/4$ in. off the part's right end to square it up. Slide the part over until it touches the block, and then cut the left end. Trim both ends of the test pieces now as well. Lay out the parts with the best sides facing up, then mark them (Photo 3).

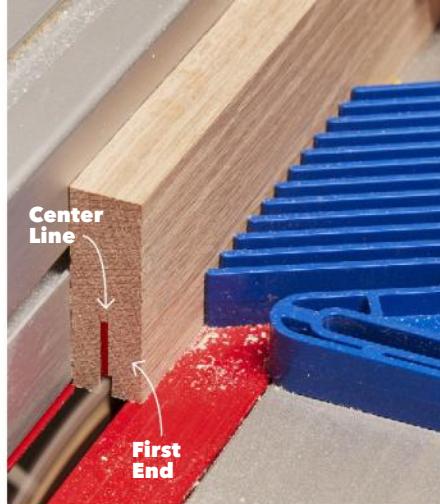
Cut custom grooves

Next, cut the grooves that receive the plywood panels and tenon tongues along the inside edges of all the pieces. The width of the grooves must match the thickness of your plywood. You'll accomplish this by making multiple passes, widening the groove a little each time until it's just right. It doesn't matter if you have a thin-kerf or standard blade—either will work. Start by drawing a center line on the end of one of your test pieces. Place this piece on your saw, then adjust the saw's fence so that the blade is positioned slightly off the line. Next, adjust the height of the blade to cut a bit more than $1/4$ in. deep. (Halfway between $1/4$ in. and $5/16$ in. is about right.) Saw a groove (Photo 4). Always use a featherboard to hold the wood tight to the fence as you push.

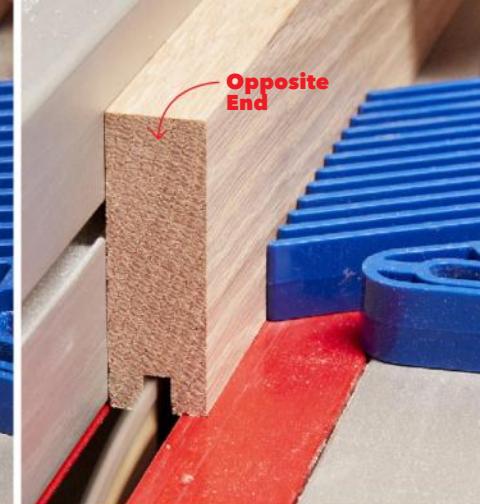
Next, flip the board end for end and make a second cut (Photo 5). This widens the groove. Check the groove's depth and adjust your blade up or down if necessary. See if your panel fits. The panel should slide into the groove without requiring any force, but it shouldn't wiggle, either. If the groove is too narrow (and it probably will be on the first try), nudge your saw's fence a tiny bit and repeat both cuts. If the groove is too wide, adjust the fence and start a new groove on the other side of the test piece. When you have the fence setting just right, cut grooves in all the rails and stiles.

Saw the tenons

This setup also requires some fine-tuning, so begin by using one of your test pieces. Put the miter gauge back on the saw and clamp a block $1/4$ in. away from the slot in the saw's fence (Photo 6). Place one of the rails or stiles next to the



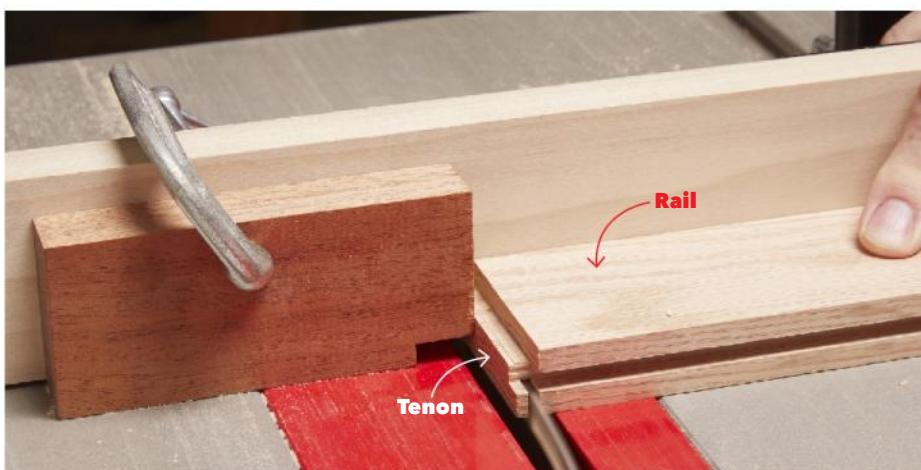
4. FIRST PASS
Raise the blade a little over $1/4$ in. Move the saw's fence so the groove will be slightly off center. Cut the groove the full length of both stiles.



5. SECOND PASS
Turn each stile end for end and cut a second groove next to the first one. See if your panel fits. If it doesn't, adjust the saw's fence and make both cuts again.



6. SET UP FOR CUTTING TENONS
Clamp a block exactly $1/4$ in. from the far side of the fence's slot. This distance is a little less than the depth of the grooves.



7. CUT THE TENONS
Adjust the blade even with the groove. Make overlapping cuts, then flip the piece over and repeat. Test the fit of the tenon in a groove. If the fit is too tight, raise the blade and try again.



8. SET THE FENCE

Next, set up the saw for cutting the plywood panel to size. Move the saw's fence so the distance from the blade matches the length of the door's rail.



9. CUT THE PANEL TO WIDTH

Rip the panel good side up to avoid scratches and chips.



10. MEASURE FOR LENGTH

Partially assemble the door. Measure the distance between the rail's tenons to determine the panel's length.

blade, then adjust the blade's height to cut just a bit lower than the groove (about $1/16$ in.).

Make overlapping cuts on one end of the test piece (Photo 7). Flip the piece over and make the same cuts. See if the tenon fits into the groove as well as the plywood did. If the tenon is too tight, raise the blade a tiny bit and cut from both sides again. If the tenon is too loose, start over using a different end of a test piece. Once you get the blade set at the correct height, saw tenons on the ends of both rails.

Cut the panel

Saw the panel to width first. It should be exactly as wide as the rails are long. Use one of the rails to position your saw's fence (Photo 8), then cut the panel (Photo 9).

To figure out the panel's length, assemble three sides of your door (Photo 10). Measure the distance between the tenons and subtract $1/16$ in. Set your saw's fence to this dimension, then saw the panel (Photo 11). Sand all edges of the panel so it slips into the grooves easily.

Glue the door

It's essential that you glue the panel into all four sides of the frame. That's what really holds the door together; the tenons alone are too short. To avoid cleaning



11. CUT THE PANEL TO LENGTH

Adjust the saw's fence to $1/16$ in. less than the distance you measured. Use a miter gauge to steady the wood when you cut it.



GET HELP WITH THE HINGES
Building doors is only part of the story. You also have to hang them. Euro, or "cup" hinges, are the easiest, most forgiving means of hanging your new cabinet doors. For help sizing your doors to fit your cabinets, along with tips for selecting and installing Euro hinges, go to familyhandyman.com and search for "Euro hinges."

up lots of excess glue, it's best to apply glue to the grooves rather than to the panel (**Photo 12**). I prefer using a small bottle of Elmer's Glue-All because its tip can be finely adjusted to lay down just a tiny amount of glue. But standard wood glue will also work.

Apply glue to both sides of the groove in one stile and one rail. Apply glue to the tenon of that rail. Push the rail into the stile, making sure the top edge of the rail is even with the end of the stile. Slide in the panel (**Photo 13**). Then apply glue to the groove, tenons and shoulders of the second rail. Slide the rail into place, again making sure it's even with the end of the stile. Apply glue to the remaining stile and nudge it into place.

Clamp the door as shown in **Photo 14**. Lay a straightedge across it to make sure it's flat. If one of the rails is tilted, correct this by raising or lowering the clamps. Wipe up the excess glue with a putty knife and a damp rag. Wait at least an hour before removing the clamps. To even up the ends of the door, cut 1/16 in. from each end using the table saw. The result: a perfect door.



12. DRIBBLE GLUE IN THE GROOVES

Apply a thin layer of glue to both sides of the groove in one stile. Apply glue to the tenon of one rail, then assemble. Make sure the rail is even with the end of the stile.



13. SLIDE IN THE PANEL

Push the panel into the assembly. Apply glue to the second rail and slide it into place. Then apply glue to the other stile and push it home.



14. CLAMP THE JOINTS TIGHT

Place the door on a couple of 2x4s to make room for the clamps. Tighten the clamps, clean off the glue, and that's it!

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37209101

A red and black 4" biscuit plate joiner with a black handle and a circular base plate. It is shown against a yellow background.

A red and black portable generator with a digital display and control panel. The brand name 'PREDATOR' is prominently displayed on the front panel.

A black and red portable thickness planer with a red handle and a black base. The Bauer logo is on the side. To the right, there's a large red circle containing the price '\$249.99'. Above the planer, the text 'Bauer' is in a large, bold, red font. To the right of the planer, there's a 'Customer Rating' section with four blue stars and a 'NEW' badge with a green border. Below the planer, there's a red box with 'COMPARE TO' and '\$399' with a line through it, and 'ITEM 63445' at the bottom.

A black and white photograph of a wooden mover's dolly. It features a rectangular wooden frame with four black wheels. The top surface of the frame is covered with a dark, textured material, likely rubber or plastic, to provide grip for moving heavy items. The dolly is shown from a slightly elevated angle, highlighting its sturdy construction and the wheels.

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LAUNDRY ROOM PEDESTAL

Save your back without spending an arm and a leg.

By Jeff Gorton

Front-loading appliances have a lot of great features, but being easy on your back isn't one of them. That's why manufacturers offer matching pedestals that raise the machines to a comfortable height. But these pedestals cost up to \$250 each, and you still won't have a place to stash laundry baskets. With our plan, you can build your own unit for about half the cost, and get a functional pedestal that will look great in any laundry room.

You can choose from the three versions we show here—contemporary, Craftsman and classic. They differ only in the amount of trim and moldings you add to the basic plywood carcass.

WHAT IT TAKES

TIME	COST	SKILL LEVEL
One weekend	\$80 to \$200	Beginner to intermediate

TOOLS Basic DIY tools, including a circular saw. A table saw, a miter saw and a finish nail gun would make the job easier.



CHOOSE YOUR STYLE!

Build it basic or deck it out with moldings.



Contemporary

Leave off the trim and you have a sleek and functional pedestal. This version doesn't require any miters, so even a beginner can build it.



Craftsman

Adding trim on the face and sides transforms the pedestal with minimal additional cost and work. Most of the trim cuts are simple right angles, so even this version is easy.



Classic

If you prefer a traditional look, add moldings. You'll need to cut a few miters to fit the moldings where they meet at the corners, so this version requires slightly more skill.

Figure A Contemporary

OVERALL DIMENSIONS:
58-1/2" Long x 31-1/2" Deep x 18-1/4" Tall

23" LONG
15" WIDE
10-1/2" TALL
SUGGESTED
BASKET
SIZE

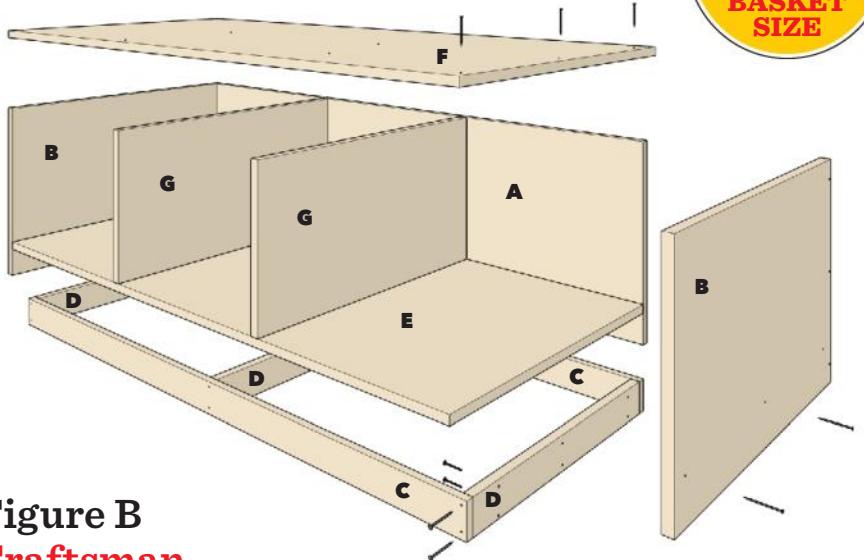


Figure B Craftsman

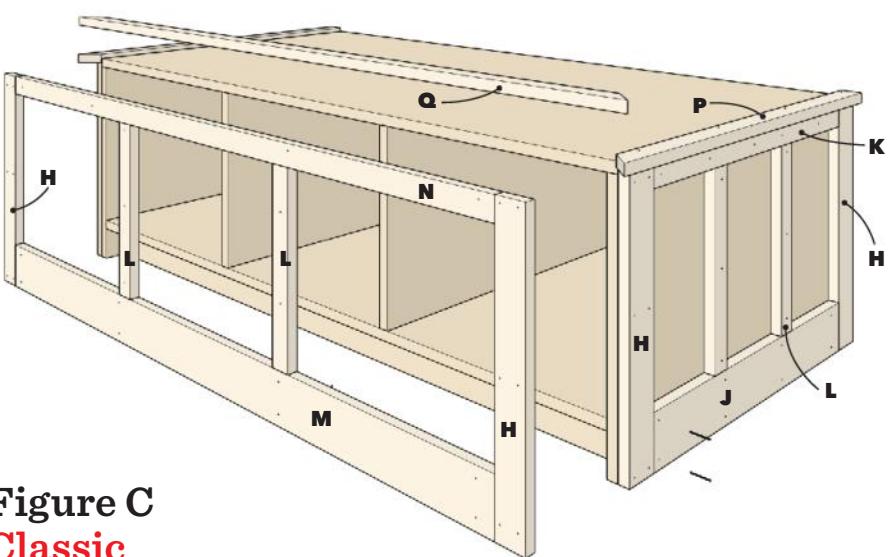
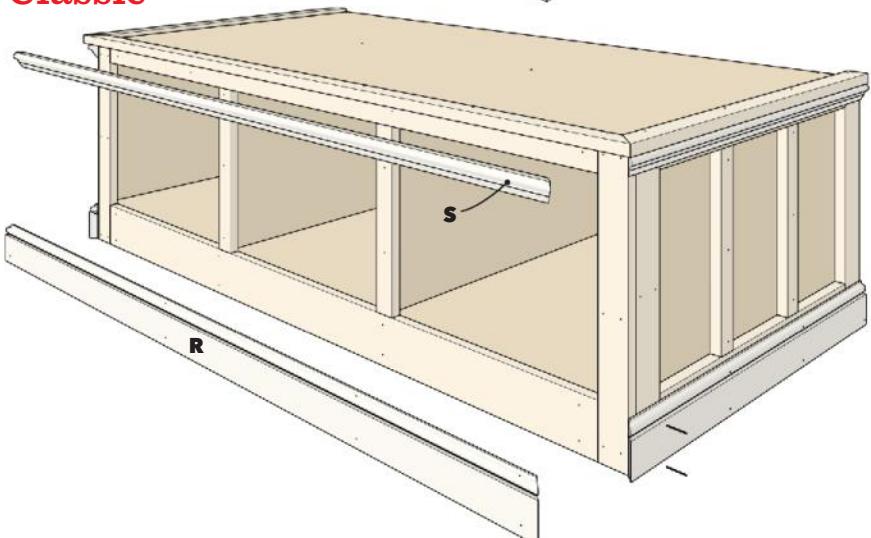


Figure C Classic





Skill, time and materials

The skill required goes up a little as the versions get fancier. Including painting, expect to spend a weekend on this project. In addition to standard DIY tools, you'll need a circular saw and a straightedge guide or table saw to cut the plywood. A miter saw would make cutting the trim for the Craftsman version easier, and is necessary if you want to add the moldings. And a finish nail gun would simplify all the trim work.

The pedestal requires two sheets of plywood, and some trim boards and moldings if you want to add them. You'll find all these at any home center or lumberyard. Remember, you can always ask to have the plywood cut into smaller pieces to fit in your vehicle. See the Materials List on p. 72.

Get started by cutting the parts

The first step is cutting the plywood parts to the right size. Follow the Cutting List at right and the Cutting Diagram on p. 75. You can get great results with nothing more than a circular saw and a straightedge guide. With a guide like this, you just make two marks on the plywood for the size of the part you're cutting. Then line up the guide with the marks and clamp it (Photo 1). The only trick is to make sure the guide is on the side you want to keep. Then run the saw along the guide's fence to make the cut.

1. CUT THE PLYWOOD PARTS

Get straight cuts with a circular saw and guide. To see how to make a guide, go to familyhandyman.com and search for "saw guide."



2. SCREW THE SIDES TO THE BACK

Drill 3/32-in. pilot holes through the sides into the back. Then drive 2-in. screws to connect the sides to the back.

CUTTING LIST

KEY	QTY.	MATERIAL	DIMENSIONS	PART
A	1	3/4" plywood	3/4" x 54" x 17-1/2"	Back
B	2	3/4" plywood	3/4" x 30" x 17-1/2"	Sides
C	2	3/4" plywood	3/4" x 54" x 2-3/4"	Toe space frame front and back
D	3	3/4" plywood	3/4" x 25-3/4" x 2-3/4"	Toe space frame sides and middle
E	1	3/4" plywood	3/4" x 54" x 29-1/4"	Bottom
F	1	3/4" plywood	3/4" x 55-1/2" x 30"	Top
G	2	3/4" plywood	3/4" x 14" x 29-1/4"	Dividers

ADD TRIM FOR THE CRAFTSMAN VERSION

H	6	1x3 board	3/4" x 2-1/2" x 17-7/8"	End stiles
J	2	1x4 board	3/4" x 3-1/2" x 25"	Bottom end rails*
K	2	1x2 board	3/4" x 1-1/2" x 25"	Top end rails*
L	6	1x2 board	3/4" x 1-1/2" x 12-7/8"	Interior stiles*
M	1	1x4 board	3/4" x 3-1/2" x 52"	Bottom front rail*
N	1	1x2 board	3/4" x 1-1/2" x 52"	Top front rail*
P	2	1x2 board	3/4" x 1-1/2" x 31-1/2"	End nosings*
Q	1	1x2 board	3/4" x 1-1/2" x 58-1/2"	Front nosing*

* Cut to fit

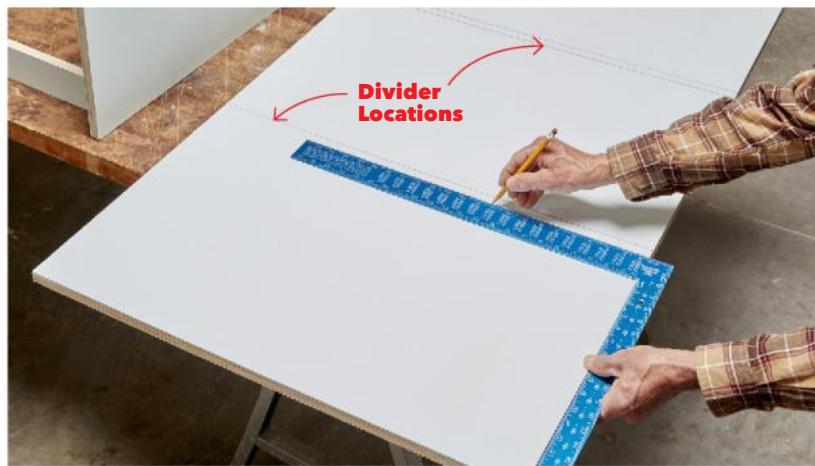
ADD MOLDINGS FOR THE CLASSIC VERSION

R	3	Baseboard molding	Cut to fit	Trim at base
S	3	Base cap molding	Cut to fit	Trim under cap



3. ADD THE TOE SPACE FRAME

Cut the parts to length from the plywood strips. Drill pilot holes and join the parts with 2-in. screws. Set the frame into place and connect it to the sides and back with 1-1/4-in. screws.



4. MARK THE DIVIDER LOCATIONS

Mark the positions of the two dividers on the top and bottom. Draw light pencil lines to indicate the edges of the panels. Turn the panels over and make a single line to indicate the center of the dividers. Use this line as a guide when you drill the screw holes. You can wash off these lines or paint over them after the pedestal is assembled.



5. ADD THE BOTTOM

Set the bottom in place and drill pilot holes for the screws. Attach the bottom to the toe space frame with 2-in. screws.

It's quicker and simpler to paint or finish the plywood parts before you assemble them. If you're building the contemporary version, you'll need to cover or fill the raw plywood edges that are exposed. You could apply veneer edge banding to the edges. But if you're going to paint the pedestal, it's easier to simply fill the edge grain with Zinsser Ready Patch or a similar product before painting. Use a small flexible putty knife to trowel the filler onto the edge of the plywood. Let the filler dry. If there are still recessed spots or holes, add a second coat. After the second coat dries, sand the filler smooth. Now you're ready to brush or roll on two coats of paint.

After the paint dries, you can assemble the carcass. Start by screwing the sides to the back (**Photo 2**). Next, build the toe space frame from the four strips of 2-3/4-in.-wide plywood. The frame is sized to allow a 2-in. toe space at the front of the pedestal (contemporary version). Set the frame between the sides and snug it up to the back (**Photo 3**). Drive 1-1/4-in. screws from the inside into the back and sides. Before you install the top and bottom, draw faint pencil lines on the inside faces to indicate the positions of the interior dividers (**Photo 4**).

Since the divider locations are slightly different for the contemporary version, make sure to use the correct dimensions (**Figure D**). On the outside face of the top and bottom, make faint center lines to

MATERIALS LIST (for all three versions)

ITEM	QTY.
4' x 8' x 3/4" plywood	2
2" screws	50
1-1/4" screws	10
Wood glue	
Paint	
Edge banding or wood filler	

Additions for the Craftsman version

1x2 x 8' paint or stain grade board	4
1x3 x 9' paint or stain grade board	1
1x4 x 9' paint or stain grade board	1
1" brads	
1-1/4" brads	

Additions for the classic version

6' base cap molding	2
6' base molding	2

Tip: Tack plywood panels together with finish nails to hold them in place while you drill pilot holes and drive the screws.

indicate where screws should be driven. Set the bottom on the toe space frame and attach it with screws (Photo 5). Then align the top and

drive screws through the top into the sides and back (Photo 6).

Finish the carcass by lining up the two dividers with your light pencil lines and securing them with screws (Photo 7). If you're building the contemporary version, you're done.

Add a face frame and decorative end panels

Adding 3/4-in.-thick trim boards to the front and sides is all that's required to build the Craftsman version. Set all the trim boards 3/8 in. below the top surface to create a 3/8-in. lip when the top nosing is applied. This lip will help ensure that your washer and dryer don't vibrate off the edge. Use glue and 1-1/4-in. brads to secure the 3/4-in.-thick trim.

Start by installing the end stiles (vertical boards) on the sides. Add the rails (horizontal boards) next, and finish the sides with the two interior stiles. Follow the same sequence to install the front trim (Photo 8). Finish this version by gluing and nailing on the 1-1/2-in.-wide nosing (Photo 9). We mitered the ends of the nosing, but you could also use square joints and simply fill and paint the exposed end grain.

Add moldings for a classic look

We chose a base cap molding for under the nosing, and matched the existing baseboard molding for the bottom trim. But you can choose any moldings to fit the style of your room. Miter the ends of the moldings and use 1-in. brads to attach them (Photo 10). We wrapped the bottom of the pedestal with standard Princeton-style baseboard to match the baseboard in the room.



6. ATTACH THE TOP

Set the top in place. Drill pilot holes and drive screws through the top into the sides and back.



7. INSTALL THE DIVIDERS

Line up the dividers with the pencil lines (see Photo 4) and secure them by driving screws through the top and bottom into the dividers.



8. NAIL ON THE TRIM BOARDS

Install the trim on the ends of the carcass, starting with the end stiles. Make sure that all of the trim is 3/8 in. below the top surface of the pedestal. Finish by gluing and nailing the trim to the front.



9. GLUE AND NAIL THE NOSING

9. Cut and fit the 1x2 nosing that runs along the two sides and front of the pedestal. Miter the ends at the corners. Then glue and nail the nosing to the top of the trim.



10. ADD MOLDINGS

10. Install the decorative trim that fits under the nosing. Miter the outside corners. Nail the trim to the pedestal.



11. COPE THE BASEBOARD

11. For a built-in look, cope the baseboard to fit against the existing base. To learn how to cope baseboard like a pro, search for "coping" at familyhandyman.com.

Photo 11 shows how you can cope your new molding to create a tight fit with an existing base molding. For more information on how to cope moldings, go to familyhandyman.com and search for "coping." If your baseboard isn't compatible or you don't care about creating a built-in look, then skip the coping step and just cut a square end on the baseboard.

When you're finished installing the trim and moldings, fill the nail holes. Let the filler dry and sand it smooth. Then brush another coat of paint on the trim and moldings to finish the project.

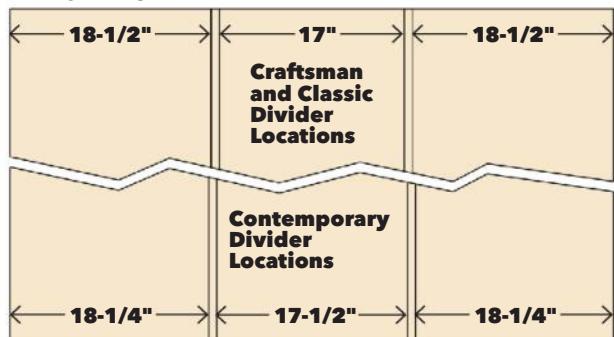
Dealing with the dryer duct

Raising your dryer also raises the position of the dryer's exhaust. And that may mean reworking the dryer's exhaust duct. If the current duct enters the wall at least 20 in. from the floor, there's no problem. But if the duct is lower than that, you'll have to raise it. Also, if you want to snug the dryer up to the wall as we did here, you'll need to recess the vent in a dryer vent box. For help with dryer ducting, go to familyhandyman.com and search for "dryer vent install."

Also take a look at the gas and/or electrical lines serving the dryer to make sure they'll accommodate a raised dryer.

Figure D Divider Locations

PEDESTAL TOP



PEDESTAL BOTTOM

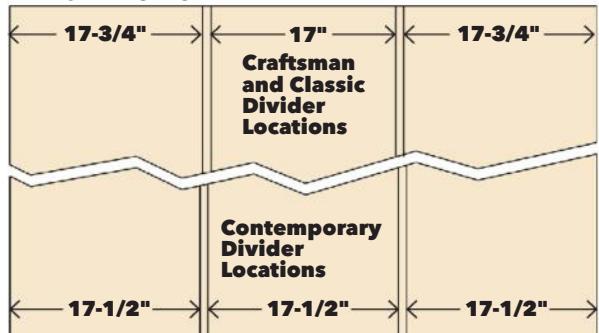
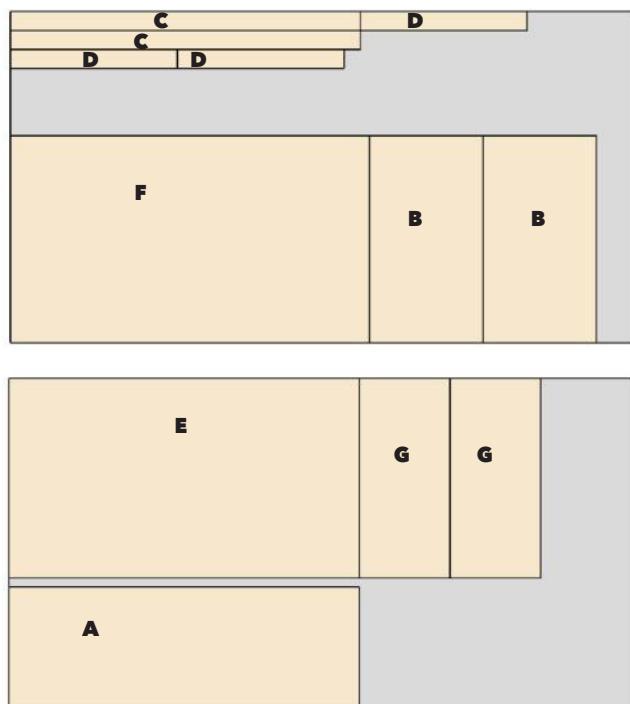


Figure E Plywood Cutting Diagram



Statement of ownership, management, and circulation

Statement required by the Act of August 12, 1970, Section 3685, Title 39, United States Code, showing the ownership, management and circulation of THE FAMILY HANDYMAN (USPS 013-271) published eight times per year (March, April, May, June, July/August, September, October/November, December/January/February) at 1610 N. 2nd St., Suite 102, Milwaukee, WI 53212-3906, as filed on Sept. 30, 2017. Annual subscription price: \$24.

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	Average	Single Issue
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Mail subscriptions	1,132,382	1,140,474
Paid distribution—sales through dealers and carriers, street vendors and counter sales	38,987	46,612
Total paid distribution	1,171,369	1,187,086
Free or nominal-rate distribution	98,209	27,243
Total distribution	1,269,578	1,214,329
Copies not distributed	66,548	78,697
Total	1,336,126	1,293,026
Percent paid and/or requested circulation	92.26%	97.76%
Paid electronic copies	34,468	23,876
Total paid print copies	1,205,837	1,210,962
Total print distribution	1,304,046	1,238,205
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Jim Woods,
Vice President, Planning, Consumer Marketing



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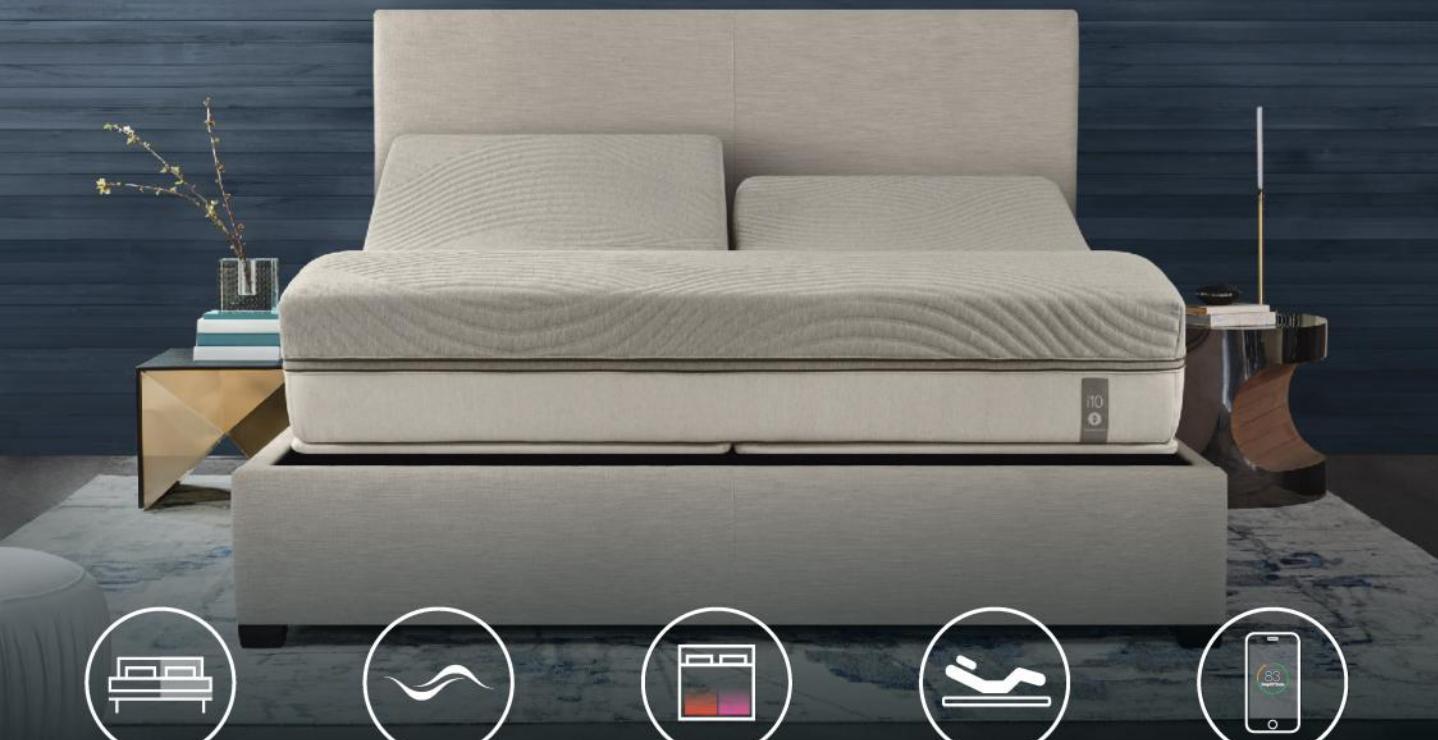
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HomeCare+Repair

Fix it, maintain it, improve it. By Brad Holden



COOL TIP

Easy ice scraping

Sick of freezing your tail off while you're scraping the rock-hard ice off your windshield? Try this cool tip. Just mix two parts water with one part isopropyl (rubbing) alcohol in a spray bottle and spray it on your windshield. The ice will melt almost instantly. The alcohol won't harm your car's paint, but it will remove car wax, so try to keep it off waxed surfaces.

To prevent ice buildup, try Prestone Ice & Frost Shield (\$5). "You spray it on before heading in for the night or when you arrive at work," says automotive expert Rick Muscoplat. "Any snow or freezing rain won't stick to your windshield. I gave it to my daughter and she uses it when she arrives at work. If it snows during the day, she just has to turn on the wipers and go."

No-wiggle toilet

If your toilet leaks because of a faulty wax ring, you might not know it until the floor is already damaged. Some say to skip the caulk around the toilet so you get an early warning of a leaking wax ring. But the most common cause of wax ring failure is movement. If you don't caulk, you're relying on two bolts to



1. Level the toilet

Set the new toilet in place, with a level on the rim to see where you need to shim under the base. Mark the shim locations on the floor with tape. Use only plastic shims.

prevent that movement. Think about it. You've got a 60-lb. toilet, 40 lbs. of water and maybe a 200-lb. person. That's a lot of strain on two bolts. Plus, according to code, a toilet must be caulked to the floor. But don't just caulk around the base after installing the toilet and hope for the best. Here's my method.



2. Set the toilet on spacers

Install the new wax ring on the floor flange. Fasten the flange bolts to the flange using nuts. Set spacers on the floor to keep the toilet off the floor.



3. Caulk the base

Apply a bead of caulk right under the base's rim. Make sure the shims are in position.



4. Seat the toilet

Press the toilet down to the floor, apply caulk where the spacers were, snug up the bolts and tool the caulking.

Note: I often find that two wax rings are needed. Calculate the distance from the top of the toilet's underside to the top of the floor flange, and then double that dimension. If that number is more than the thickness of one wax ring, use two. The flange is supposed to be flush

with the finished floor. If it's not, I may also recommend using an extension flange and/or replacing the collar or flange so the flange is flush with the floor. Make sure the floor flange is securely attached to the floor and that the floor itself isn't in need of repair.



MEET THE EXPERT
Les Zell is a master plumber with more than four decades of experience in the field.

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HOME CARE+REPAIR



PROTECT YOUR INVESTMENT

Aluminum wiring can be hazardous

If you have aluminum wiring in your house, you might have a fire waiting to happen. Many houses built between 1965 and 1972 were wired with aluminum instead of copper. The wiring itself isn't a problem; aluminum conducts electricity safely. The trouble is at the connections. The U.S. Consumer Product Safety Commission (CPSC) reports that homes with aluminum wiring are 55 times more likely to have "fire hazard conditions" than homes wired with copper.



Fix the problem

Completely rewiring your home isn't practical in most situations—it means tearing into walls and ceilings. But an electrician can make the connections safe by adding a short section of copper wire to the end of each aluminum wire. That way, copper rather than aluminum will be connected to each switch, outlet or other device.

COPALUM connectors are preferred by the CPSC, but they require a trained contractor and a special tool. AlumiConn is another brand that can be purchased from online suppliers. These connectors can be installed by any trained electrician but may require that existing junction boxes be replaced with larger ones to make room for the connectors.



BOTTOM PHOTO: ALUMICONN



MEET THE EXPERT

Tom Dvorak is a remodeler and property manager who buys and renovates homes in the Twin Cities area.

PROBLEM SOLVER

Stop mice before they come in

At my rental properties, I control mice by exterminating them before they come inside. I place these bait stations outside near the foundation and load each of the vertical tubes with several poison bait blocks on a rod. A six-pack of JT Eaton 902 Top Loader Bait Stations costs \$68 at DoMyOwnPestControl.com. You can also zip-tie them to a roof rafter or to the top of a fence to get mice that travel those routes. They've dramatically decreased my mouse issues.

TOM DVORAK

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Car + Garage

Expert advice on repair, maintenance and gear. By Rick Muscoplat

5 Fixes That Save You Cash

Here are five of the best ways to save money on car maintenance. These are easy jobs that you can do yourself in minutes instead of overpaying at the oil-change joint. Do each one as needed throughout the year and you'll leave about \$175 in your wallet.

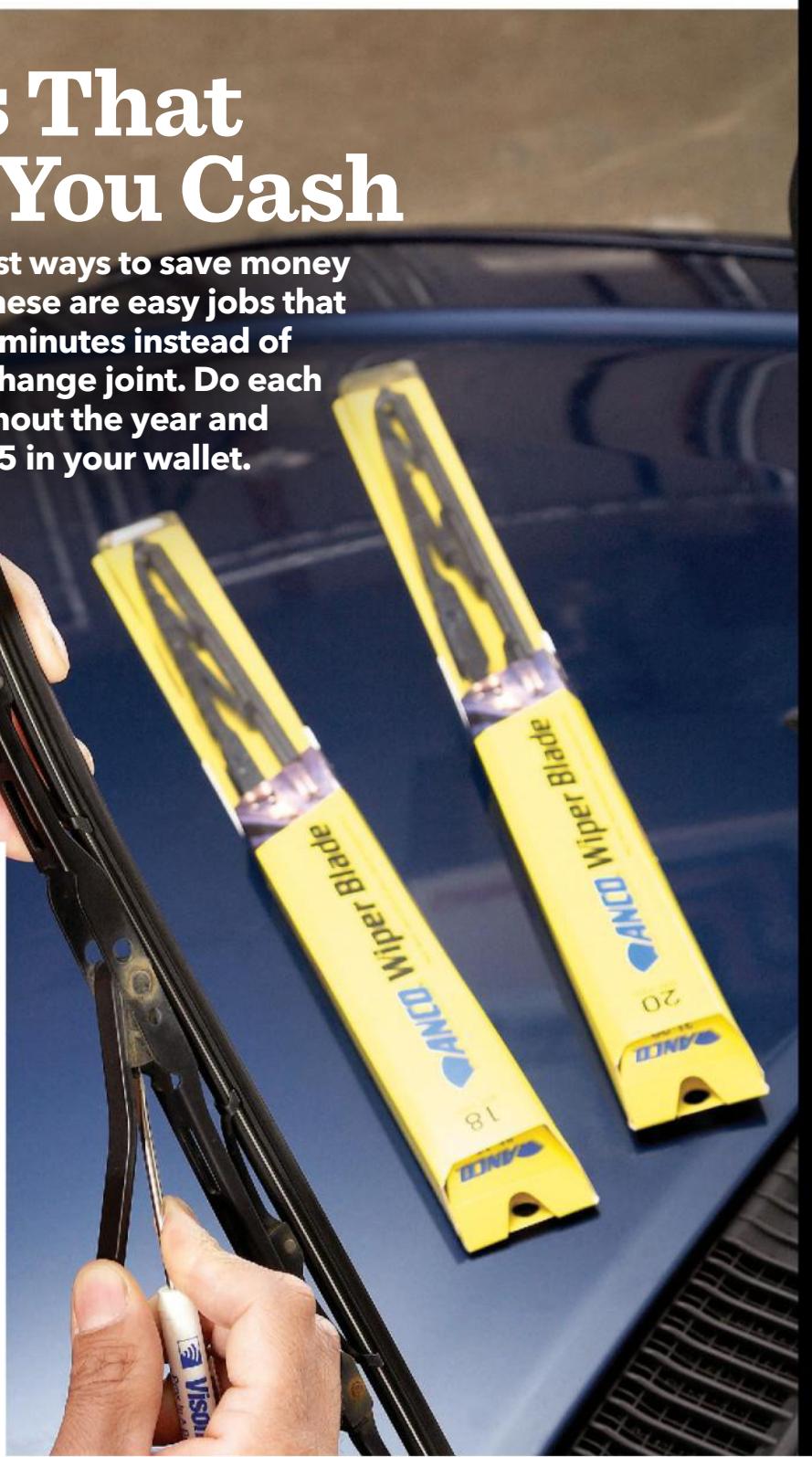
1

Replace your wiper blades

DIY SAVINGS: \$20

It's easy to tell when your blades need replacing. Simply press the washer button and see if they wipe the windshield clean. If you see streaks, the blades are done. The auto parts store will have lots of economy blades, but get a name brand instead (such as ANCO, TRICO or Bosch). They cost more, but their higher-quality rubber wipes better, has better UV protection and lasts longer.

Follow the installation instructions on the package. Be sure you have a firm grip on the wiper arm once you remove the old blade. If it gets away from you, it can hit the windshield with enough force to crack it.



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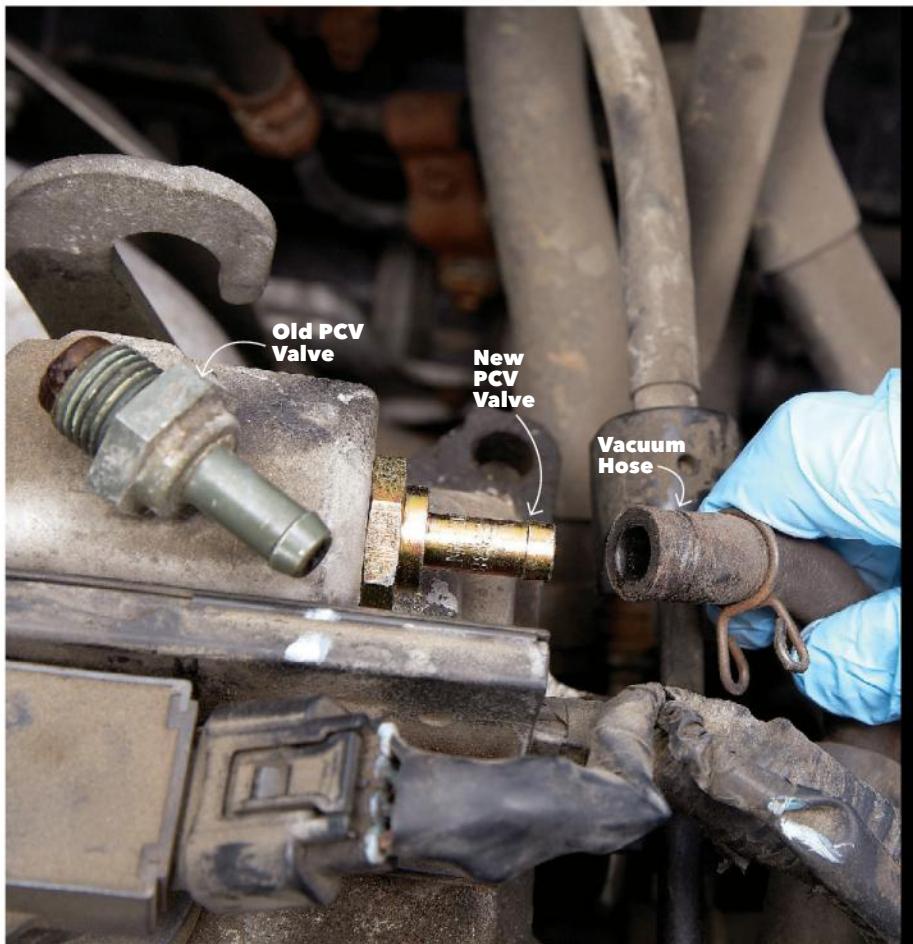
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2 Shake your PCV valve

DIY SAVINGS: \$12

If your car has a PCV valve (some late-model cars don't), pull it out every other oil change. In most cases, you'll find the valve on the top of the engine, connected to a vacuum hose. Slide the vacuum hose off the valve and unscrew the valve. Then perform the world's easiest diagnostic test: Shake it. If it makes a metallic clicking sound, it's good. If it doesn't make noise or sounds mushy, replace it (\$4). But don't replace it on appearance alone—all used PCV valves look dirty.

Need help locating your PCV valve? Buy a short subscription to an online factory service manual, which you can get at sites such as eautorepair.net and oem1stop.com. Non-factory manuals are cheaper, but they're skimpy on instructions and diagrams for repairs like this.



Air Cleaner Box

Passes Test



3 Replace your air filter

DIY SAVINGS: \$30

Told that your engine air filter needs replacing? It may be true. But testing your filter is easy and replacing it is a brainless task—so do it yourself. Replace the filter (\$12 to \$20) based on its actual condition rather than the manufacturer's recommended service intervals. Checking its condition isn't rocket science. Just pull it out and examine it (**right photo**). If it fails the backlight test, replace it. While the filter is out, vacuum out the crud in the air cleaner box.

REMOVE THE AIR FILTER and vacuum out any dirt. Then hold it in front of a shop light. If dirt blocks more than 50 percent of the light, replace the filter.

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“I had to get my son to program it.” Your Jitterbug Flip setup process is simple. We'll even program it with your favorite numbers.

“What if I don't remember a number?” Friendly, helpful Personal Operators are available 24 hours a day and will even greet you by name when you call.

“I'd like a cell phone to use in an emergency.” Now you can turn your phone into a personal safety device with 5Star® Service. In any uncertain or unsafe situation, simply press the 5Star button to speak immediately with a highly-trained Urgent Response Agent who will confirm your location, evaluate your situation and get you the help you need, 24/7.

“My cell phone company wants to lock me in a two-year contract!” Not with the Jitterbug Flip. There are no contracts to sign and no cancellation fees.



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Monthly Minutes	200	600
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Voice Dial	FREE	FREE
Nationwide Coverage	YES	YES
30-Day Return Policy ²	YES	YES

More minute plans and Health & Safety Packages available.

Ask your Jitterbug expert for details.

“My phone's battery only lasts a short time.” Unlike most cell phones that need to be recharged every day, the Jitterbug Flip was designed with a long-lasting battery, so you won't have to worry about running out of power.

“Many phones have features that are rarely needed and hard to use!” The Jitterbug Flip contains easy-to-use features that are meaningful to you. A built-in camera makes it easy and fun for you to capture and share your favorite memories. And a flashlight with a built-in magnifier helps you see in dimly lit areas. The Jitterbug Flip has all the features you need.

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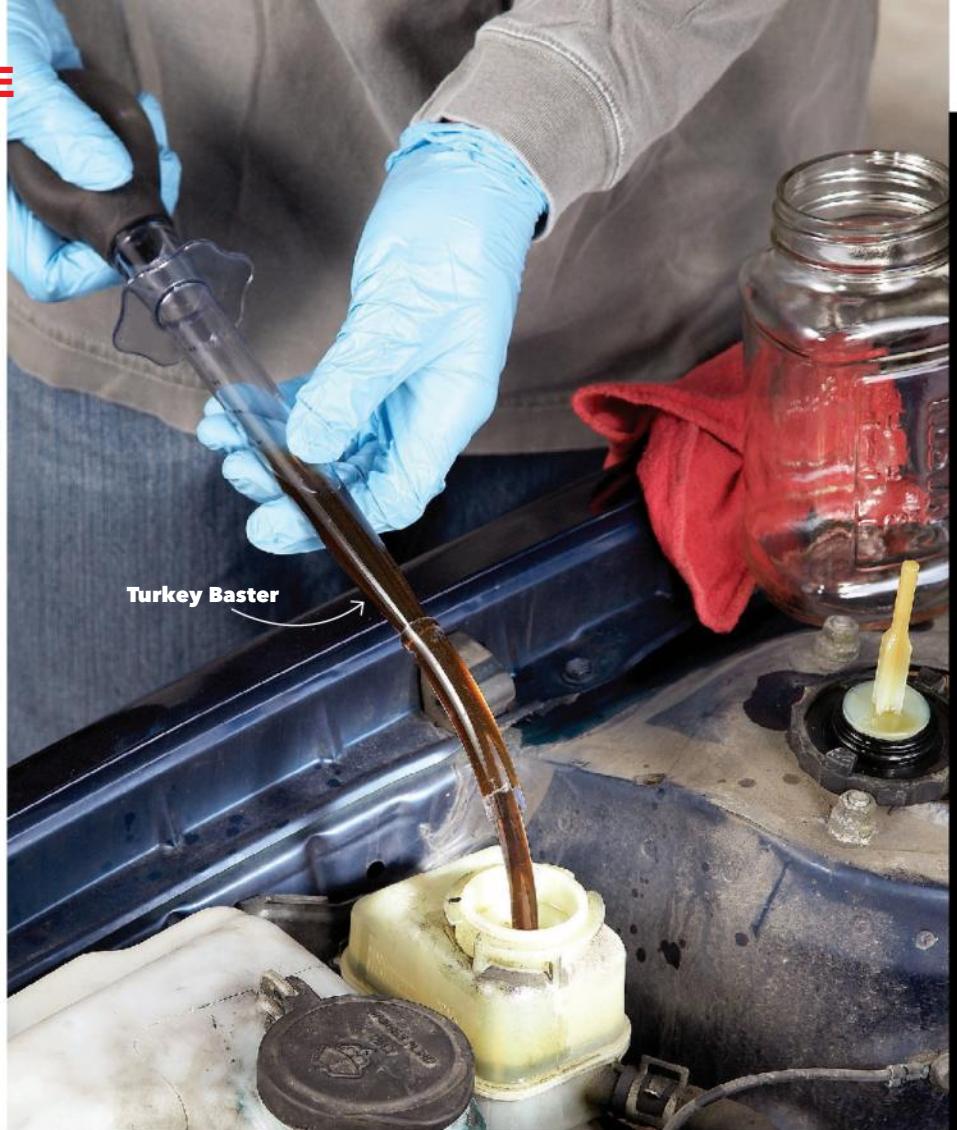


4 Change power steering fluid

DIY SAVINGS: \$55

There aren't any test strips for power steering fluid, so you'll have to rely on the manufacturer's service recommendations or general rule of thumb (two years or 24,000 miles). Use the turkey baster method to remove the old power steering fluid. Suck out all the fluid (engine off) as shown. Then refill the reservoir with fresh fluid. Start the engine and let it run for about 15 seconds. Repeat the fluid swap procedure until you've used up the full quart.

Note: Never substitute a "universal" power steering fluid for the recommended type, and never add "miracle" additives or stop-leak products. They can clog the fine mesh filter screens in your steering system and cause expensive failures.



5 Swap out brake fluid

DIY SAVINGS: \$60

Some carmakers recommend replacing brake fluid every two years or 24,000 miles. Others don't mention it at all. But it's easy to test your brake fluid. Just dip a test strip into the fluid and compare the color to the chart on the packaging.

You can't do a complete brake fluid flush yourself, but you can do the next best thing—a fluid swap. This procedure will introduce enough new fluid to make a difference.

Use a baster to suck out the dark brown brake fluid (brake and power steering fluids are incompatible, so use a different baster for each). Squirt it into a recycling bottle. Refill the reservoir with fresh brake fluid as shown. Then drive the vehicle for a week to mix the new fluid with the old. Repeat the procedure several times over the next few weeks until the fluid in the reservoir retains its light honey color.

Note: The brake fluid may damage the baster's rubber bulb, so don't suck the fluid all the way into the bulb.



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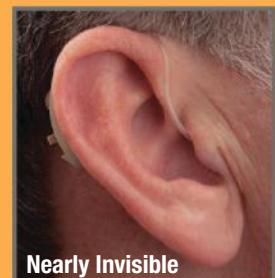


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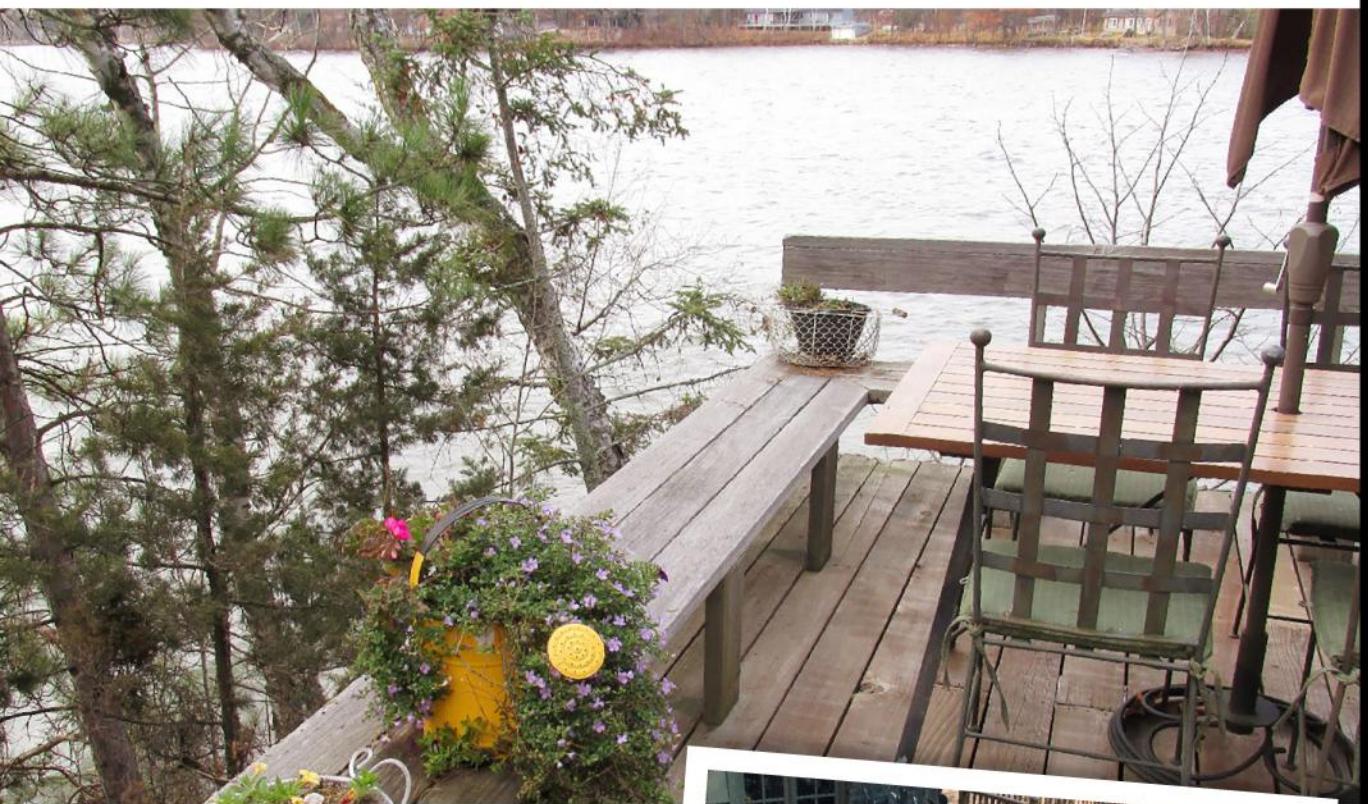
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WHAT'S WRONG WITH THIS PICTURE?

We'll show you the problem—and the fix. By Jeff Gorton



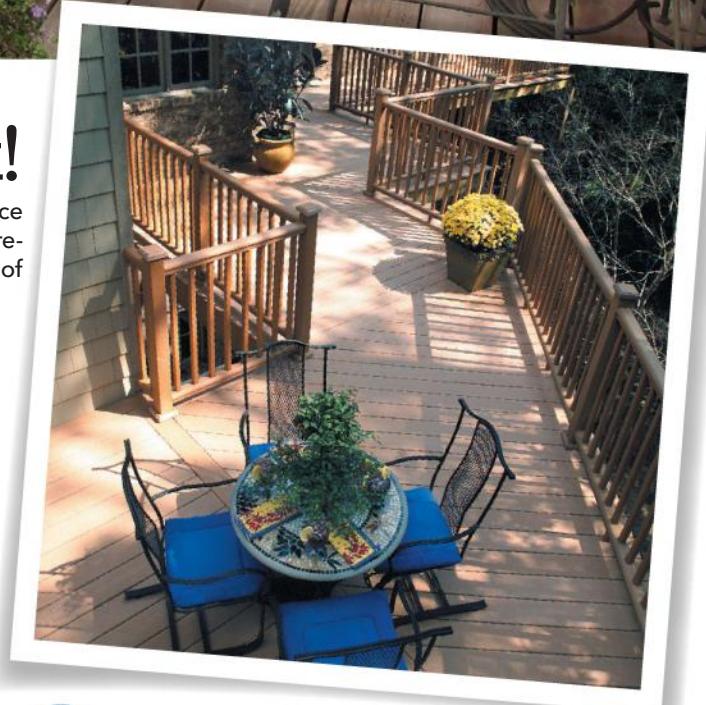
DANGEROUS DECK

Don't Lean Back!

The bench in the photo above looks like a nice place to sit and enjoy the view, and it would prevent you from accidentally walking off the edge of the deck. But it's not a substitute for a guardrail.

THE RIGHT WAY:

Codes may vary by municipality, but where the International Residential Code is in force, decks that are more than 30 in. above the ground are required to have a guardrail that measures at least 36 in. from the deck surface to the top of the guardrail. Also, the guardrail design must not allow a 4-in. sphere to fit through any opening. And finally, the guardrail must be able to withstand a concentrated 200-lb. force anywhere along the top of the rail. The deck in the bottom photo meets these requirements.



Thanks to our friends at the American Society of Home Inspectors for sharing photos submitted by their members. For more, visit ashireporter.org.

How To: Fix Your Fatigue and Get More Energy

According to patients at the Center for Restorative Medicine, a discovery has completely transformed their lives.

Founder and Director **Dr. Steven Gundry** is a world-renowned heart surgeon, a best-selling author, and the personal physician to many celebrities. But his breakthrough could be the most important accomplishment of his career.

Dr. Gundry has unveiled a simple — yet highly effective — solution to issues that plague millions of Americans over 40: low energy, low metabolism and constant fatigue.

“When you’re feeling low energy, that’s your body screaming **HELP!**” Dr. Gundry’s radical solution was inspired by a breakthrough with a “hopeless” patient who had been massively overweight, chronically fatigued and suffering from severely clogged arteries.

The secret to his breakthrough? “**There are key ‘micronutrients’ missing from your diet,**” Dr. Gundry said, “If you can replenish them in very high dosages, the results can be astonishing.”

This unorthodox philosophy is what led Dr. Gundry to create an at-home method for fatigue — which has since become remarkably successful with his patients.

“They’re reporting natural, long-lasting energy without a ‘crash’ and they’re



feeling slim, fit and active,” he revealed yesterday.

Dr. Gundry’s team released a **comprehensive video presentation**, so that the public can be educated as to exactly how it works.

Watch the presentation here at **www.GetEnergy28.com**

Within just a few hours, this video had gotten thousands of hits, and is now considered to have gone viral. One viewer commented: “If this works, it’s exactly what I’ve been praying for my whole life. I’ve never seen anything like this solution before...the truth about my diet was shocking and eye-opening.”

It makes a lot of sense, and it sounds great in theory, but we’ll have to wait and see what the results are. Knowing Dr. Gundry, however, there is a great deal of potential.

See his presentation here at **www.GetEnergy28.com**

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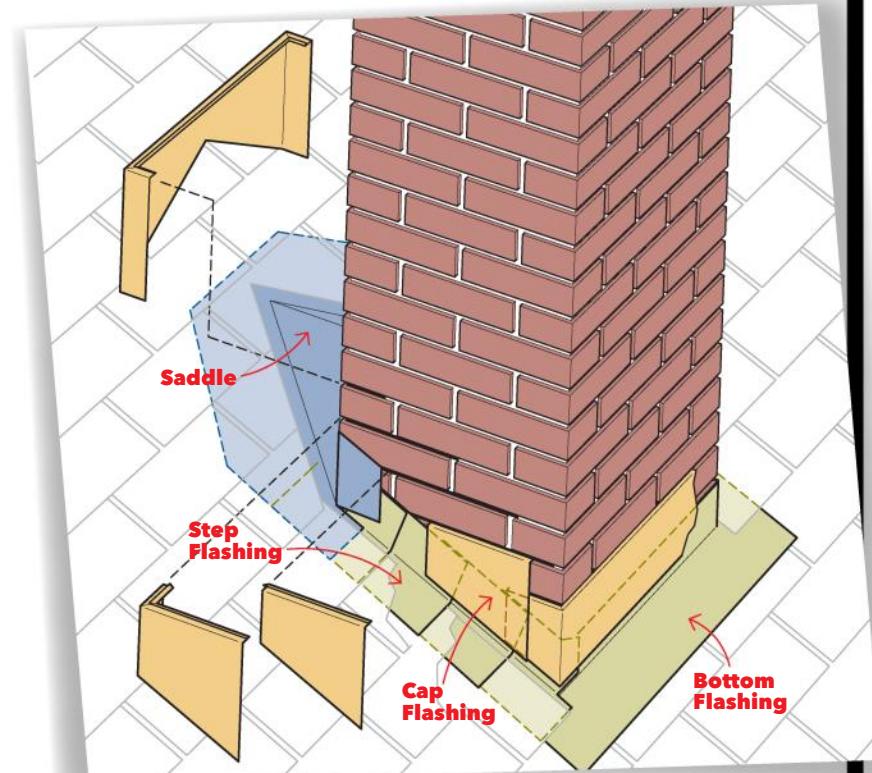
FAST TRACK FOR LEAKS

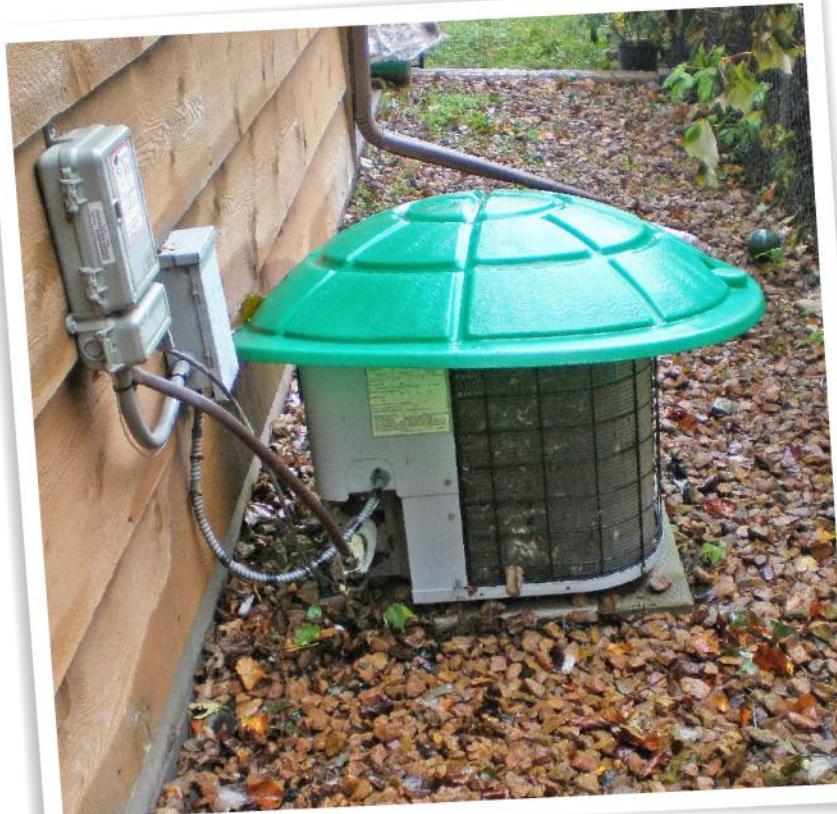
Missing Cap Flashing

At first glance, this chimney-flashing job looks good. But wait! How does it keep out water? There's a gap between the chimney and the flashing—any water running down the bricks will run right into the house.

THE RIGHT WAY:

A properly flashed chimney should include a bottom flashing as shown in the photo, step flashing along the edges and a saddle or head flashing at the uphill side. The flashings are installed starting at the bottom. The step flashing pieces are added under each course of shingles and overlap one another. Finally, a cap flashing must be installed to cover the step flashing. Most old chimneys have cap flashing inserted in the mortar joints between bricks. But if it's missing or needs to be replaced, you can cut a groove into the bricks and caulk an L-shaped cap flashing into the groove and bend it down over the roof flashings.





TURTLE DISGUISE

Looks Funny, Works Great

This air conditioner compressor covered with a plastic sandbox lid may look funny. But this is actually a good way to protect your compressor in the off-season. Covering the top keeps out debris and protects the compressor from falling branches or ice during the winter in cold climates. And the open sides allow air to circulate. The only downside of the "turtle shell" system is that it will surely blow off and should be strapped down in some way.



NOT AS GOOD:

Completely enclosing a compressor with a cover, even a purchased one like this, can trap moisture, which leads to corrosion. It also creates a perfect nesting place for mice. The simple cover in the top photo is actually much better.

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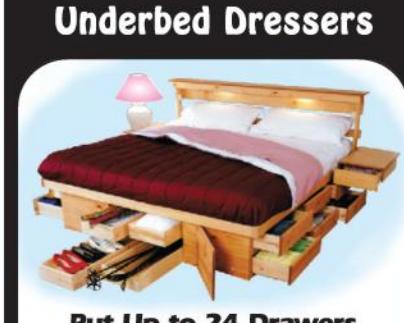
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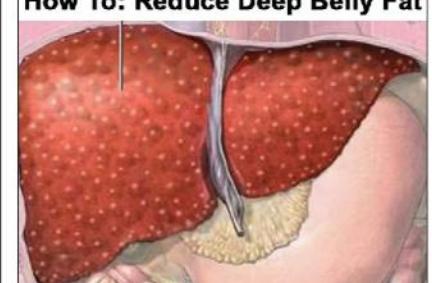
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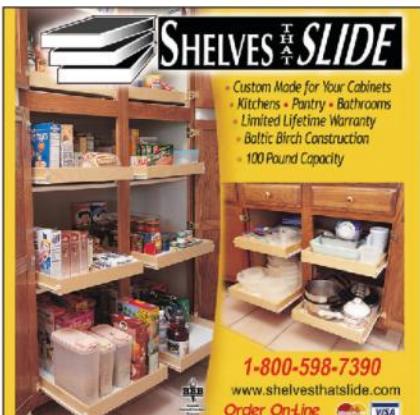
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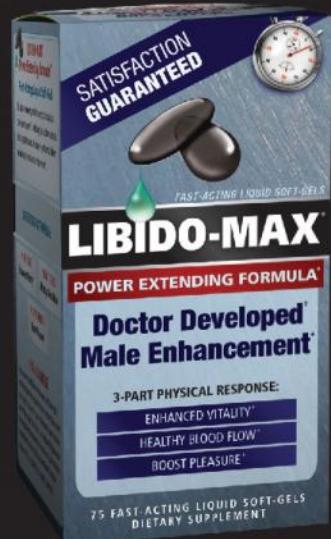
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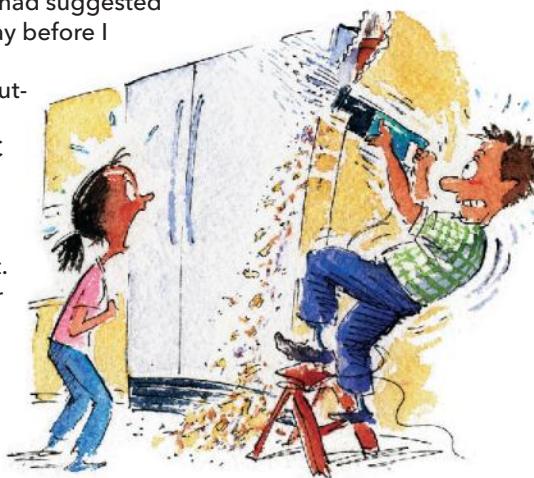
SCRATCH AND DENT

We finally upgraded to a side-by-side refrigerator, one that would fit perfectly between our cabinets. But when it was delivered, we were unable to open the right side all the way because of a projecting wall. No problem—I fetched my reciprocating saw to shorten the wall a bit.

Well, the saw teeth caught the drywall corner bead, and the saw blade jumped right into the top corner of the new fridge, scratching the heck out of the paint. At this point, the fridge had been in our house for less than 30 minutes, and yes, my wife had suggested that I move it out of the way before I started to cut.

Undeterred, I finished cutting the wall, which, I discovered, concealed a PVC vent pipe. I spent the rest of the afternoon in the crawl space under the house, relocating the vent. It gave me time to ponder how I had gotten myself into both a kitchen remodel and the dog-house all over a new refrigerator.

GARY SHIMMEL



BROKEN TOY BOX

The toys at my northern Michigan cabin were multiplying, so I doubled the length of the garage. To save money, I hand-framed the roof rather than use factory-built trusses. With all this extra space, I'd be able to buy even more toys!

After several snowstorms up north, I received a call from my neighbor, who asked the ominous question, "Remember the garage you used to have?" The weight of the snow had caused the roof to cave in, crushing my speedboat, trailer, snowmobiles and dirt bike. After careful forensic study, I concluded the overloaded rafters had pushed out the walls until the roof collapsed. I probably needed to use more crossties, leaving me with the lesson that a sturdy toy box is worth the extra expense.

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